Work Plan for Removal Action

Melville Water Tower NAVSTA, Newport, Rhode Island



Naval Facilities Engineering Command Mid-Atlantic

Contract Number N62467-04-D-0055
Contract Task Order 405

August 2007





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Project Number G00825

Mr. James Colter Remedial Project Manager Facilities Engineering Command, MIDLANT Environmental 9742 Maryland Ave Norfolk VA, 23511-3095

Reference:

CLEAN Contract No. N62467-04-D-0055

Contract Task Order No. 405

Subject:

Transmittal of Final Removal Action Work Plan for Soil Excavation

Melville Water Tower Site, Portsmouth, Rhode Island

Dear Mr. Colter

Provided attached to this letter, you will find four copies of the Final Work Plan for Soil Removal Actions (two electronic, two paper copies) for the site referenced above. This work plan has been revised based on the draft submitted on July 2007 and responses to comments from the U.S. EPA and RIDEM dated August 9, 2007.

As you know, the work proceeded immediately after submission of the Draft Work Plan so as to assure completion of the action during the school summer holiday in accordance with the wishes of the town of Portsmouth and the School District. Changes to the work plan were minor as noted in the August 9, 2007 correspondence, and were incorporated into the work during construction.

In accordance with the task order, copies of this work plan have been provided to the persons on the distribution list below for their records. If you have any questions regarding this material, please do not hesitate to contact me.

Very truly yours

Stephen S. Parker, LSP

Project Manager

SSP/ld

Enclosures

: B. Capito, NAVFAC (w/encl. - 1 CD, 1 Paper)

K. Keckler, USEPA (w/encl. - 2 CD, 2 Paper)

P. Kulpa, RIDEM (w/encl. - 2 CD, 2 Paper)

P. Loht, Gannett Fleming (w/encl. - 1 CD, 1 Paper)

C. Mueller, NAVSTA (w/encl. - 1 CD, 1 Paper)

NAVSTA Portsmouth Repository - (c/o C. Mueller w/ encl. - 1 CD)

L. Rapp, NAVFAC (w/o encl.)

J. Trepanowski/ (w/encl. - 1 CD)

G. Glenn, TtNUS (w/o encl.)

File G00825-3.2 (w/o encl.) File G00825-8.0 (orig. - 1 CD)

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WORK PLAN

FOR

REMOVAL ACTION

MELVILLE WATER TOWER NAVSTA, NEWPORT, RHODE ISLAND

COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

Submitted to:
Naval Facilities Engineering Command Mid-Atlantic
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CONTRACT NUMBER N62467-04-D-0055 CONTRACT TASK ORDER 405

August 2007

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1.0 INTRODUCTION

Tetra Tech NUS (TtNUS) has prepared this removal action (RA) work plan to describe the Removal Action (RA) and related activities that will be performed to remove and dispose of subsurface structures and contaminated soil at the Melville Water Tower (MWT) site located in Portsmouth, Rhode Island.

The work described in this plan includes mobilization, site and staging area preparation, soil and structure excavation and removal, prevention of contaminant migration, confirmation sampling, waste characterization, equipment decontamination, off-site transportation and disposal, site restoration, and demobilization.

This removal action is being conducted in accordance with the Action Memorandum (Draft – 6/15/07) prepared under the Installation Restoration Program and Federal Facilities Agreement.

1.1 PROJECT BACKGROUND

The Naval Station Newport (NAVSTA) is located in Newport, Rhode Island. The Former Melville Water Tower Site is located next to The Melville Elementary School, 1351 West Main Road in Portsmouth, Rhode Island. The water tower had been present for approximately 50 years. The surface of the site is grass and trees, with the exception of gravel located on the western side of the site and an asphalt path on the eastern edge.

The water tower was constructed as part of the Melville fuel depot water supply system in the 1940s. Specifically, an 8-inch "high service filtered water line" extended from the water tank to a series of hydrants and pump houses to service the fuel storage tanks and fueling piers located at the Melville Patrol-Torpedo Squadron Training Station. The 8-inch water line provided a sanitary and potable water supply as well as an emergency fire fighting water supply for the permanent station structures. It also served as standby water reserve for the fuel oil tank fire protection system in this area (US Navy, 1943).

Figure 1-1 presents the location of the Former Melville Water Tower. Figure 1-2 presents a base map of the work area.

1.2 PROJECT OBJECTIVES

The primary objective of the removal action at the MWT site is to excavate and remove soil that contains lead in excess of applicable regulatory criteria. Applicable regulatory criteria for this site include Rhode Island Department of Environmental Management (RIDEM) Direct Exposure Criteria for residential use

soil (150 mg/kg lead in soil) at the site. This criteria was determined to be applicable due to the proximity to the elementary school. To accomplish this objective, the Navy will also remove existing foundations, and remove and cap the existing water connection to the location of the former tower.

Because of the location of the site adjacent to an elementary school, the work must be conducted when the school is closed. The summer vacation period of 2007 has been selected as a construction window for this effort. In order to meet an accelerated schedule, the general approach is to over-excavate contaminated soil so as to reduce the likelihood of returning to conduct additional excavations if the confirmation samples fail to meet project objectives.

The following sections detail the procedures for conducting this work.

2.0 PROJECT MANAGEMENT

TtNUS will assemble a construction management team that will be responsible for all technical and administrative aspects of the remediation project. The technical responsibilities of the team will include: assuring that all remediation activities are completed in accordance with this work plan; management of construction activities including work performed by remediation subcontractors; and complying with all applicable local, state, and federal regulations. Included among the team's administrative responsibilities are establishing and maintaining project communications, controlling cost and schedule of the project, document control, and conducting routine project status meetings.

2.1 CONSTRUCTION MANAGEMENT TEAM ORGANIZATION

The following general positions are considered as key construction management team members for the performance of this project. Other support staff (QA, safety, and management staff) are anticipated to be involved on a supervisory level and therefore not explicitly defined for this work plan. A project organization chart is attached as Appendix A.

Project Manager: The responsibility of the Project Manager will be to provide general oversight of all facets of the project. He will be responsible for the oversight, resource allocation, scheduling, and quality control of the project. He will report to the Navy Contracting Officer (NAVFAC) and is the first point of contact for the Contracting Officer's Technical Representative presumed to be the Navy Resident Officer in Charge of Construction (ROICC).

Project Engineer: The Project Engineer will be responsible for all on-site construction activities including supervision of the remediation subcontractor. The Project Engineer will also provide guidance to field construction staff relating to compliance with the RIDEM Remediation Regulations and RA work plan, and prepare technical plans and submittals. This individual will report directly to the Project Manager and ROICC and will interface with the Oversight Engineer and subcontractors on a daily basis to ensure that quality control standards are met.

Subcontract Manager: The Subcontract Manager will be responsible for procurement and subcontracts and will interface as needed with the Project Manager. The Subcontract Manager reports to the CLEAN Program Manager.

Health and Safety Manager: The Health and Safety Manager (HSM) will be responsible for general oversight of the health and safety procedures used on this project. He will consult with and give direction to the Site Health and Safety Officer.

Site Health and Safety Officer: The Site Health and Safety Officer (SHSO) will be responsible for the overall health and safety of all employees on-site. The SHSO will be responsible for daily health and safety monitoring, implementation of all health and safety procedures and requirements, and maintenance of health and safety records. The SHSO will have the authority to shut down any operation that is deemed by him to be unsafe. He will report to the HSM and interface closely with the Project Engineer.

Oversight Engineer: An oversight engineer [Navy Resident Officer in Charge of Construction (ROICC) or NAVFAC representative] will be provided by the Navy to monitor project activities, financial expenditures, and waste quantities generated. It is currently anticipated that TtNUS will fill the role of oversight engineer, and will provide a staff engineer on site for all activities.

Remediation Subcontractor: TtNUS will procure an environmental remediation firm as its subcontractor to implement the construction phase at the MWT Site. Only firms that are experienced in the main elements of this project (soil excavation, contaminated soils handling, and site restoration), are qualified to work on hazardous waste sites, and have the necessary personnel to adequately perform the work in accordance with the requirements of an approved HASP will be eligible for this subcontract. To be considered, firms must have proven competence in five factors (project experience, personnel, equipment, health and safety, and financial). In addition, firms with an unacceptable health and safety record will not be considered qualified.

2.2 PROJECT COMMUNICATION

Communication between the TtNUS Construction Management Team and NAVSTA Security, Public Works, NAVSTA Environmental, and other departments will be through the Construction NTR in the office of the ROICC or another NAVFAC representative. The Navy will notify the EPA and RIDEM regarding all field activities. Specifically, advance notice of one week will be provided prior to the start of field activities, and 24-hour notification will be given for the cancellation of activities whenever possible. Further, to account for the dynamic nature of the work schedule, the Navy each week will notify the EPA and RIDEM via email of the weekly schedule of upcoming activities.

2.3 PROJECT SCHEDULE

In accordance with the Action Memorandum, the construction schedule for implementation of the Removal Action is as follows:

Milestone	Proposed Start Date	Proposed Completion Date
Removal Action Work Plan	05/01/07	07/09/07
Soil Excavation and Removal	07/16/07	08/24/07
Characterization and Final Disposal	07/31/07	09/30/07
Removal Completion Report	09/04/07	01/24/08

2.4 DOCUMENT CONTROL

Quality control records, field and laboratory test reports, submittals and approvals, as-built drawings, changes to the contract, updated construction schedules, invoices, daily reports, and all other project record documents, as required, will be maintained in the project files. The files will be located in the site office and available for review by the Navy.

Technical changes to the work identified by the RA Contractor, technical questions concerning regulations and specifications, and reporting of non-conforming items will be documented in writing by the Project Manager after approval by the Navy. Such documentation will be prepared by members of the construction management team and distributed to the Navy for disposition. Copies of these documents will be maintained in the project files. Samples of the reports, the formats to be used for the reports, and the daily reports will be included in a Construction Quality Control (CQC) Plan prepared by TtNUS.

2.5 PROJECT MEETINGS

Pre-Construction Meeting: Before commencement of work on-site, the Construction Management Team, the Remediation Subcontractor staff, the Navy, and their representatives will meet to discuss coordination of the project. Items discussed in this meeting will include access to the site, working hours, specific health and safety issues, and general scheduling of the work. Summary notes of this meeting will be recorded and provided to attendees within five business days of the meeting. Appendix B contains a suggested agenda for this meeting.

Project Start Meeting: A meeting will be held on-site with the EPA and RIDEM to explain the project plan and process for conducting the work. Summary notes of this meeting will be recorded by the Project Manager and provided to attendees within 5 business days of the meeting.

Weekly Quality Control (QC)/Progress Meetings: QC/Progress Meetings with the Navy will be conducted once each week on Monday. The meetings will be held at the Construction Management Team field

office unless otherwise requested by the Navy. Meeting notes will be distributed by email or fax within 2 business days of the meeting. Appendix B contains the proposed agenda for these meetings.

3.0 FIELD ADMINISTRATIVE PROCEDURES

3.1 DAILY SAFETY MEETING

The Remediation Subcontractor supervisory personnel will hold daily safety meetings to advise workers of proper methods for performing the work planned for the day. The topics of discussion will be listed on a sign-in sheet, which will be kept as a record of the meeting.

3.2 STATUS REPORTS

Every day that work is performed, TtNUS will prepare and submit a Daily Report to the Navy ROICC. The report will summarize the daily construction activities, soil quantities excavated and transported, quantities of pay items executed, list of the manpower and equipment that were used, list of materials and equipment that were received, and the quality control testing and inspection that was performed. The report will be submitted to the Navy on the following business day. Weekly, TtNUS will summarize the contents of the Daily Reports for submittal to the Navy, EPA, and RIDEM.

3.3 SUBMITTAL REGISTER

The Construction Management Team will prepare and continually update a Submittal Register to document quality control for materials, inspection, and testing. The Submittal Register will be maintained on-site and available for review.

3.4 PHOTOGRAPHIC LOG

The Construction Management Team will document progress and final inspection using photographic documentation.

3.5 REGULATORY AGENCY PERSONNEL SITE VISITS

Regulatory agency personnel who visit the site and have questions or comments concerning the work will direct those questions or comments, in writing, to the Navy Remedial Project Manager, who will then discuss them with the contractors as needed. Comments provided to the construction management team will be brought to the Navy Remedial Project Manager as necessary.

4.0 REGULATORY OBJECTIVES

In accordance with the Action Memorandum, the primary remedial objective governing the project is the RIDEM direct exposure criteria for residential use soil of 150 mg/kg for lead (RIDEM Remediation Regulations, Section 8; DEM-DSR-01-93). The work as described in this RA Work Plan will meet the applicable requirements of the regulations and policy documents as listed below:

- Clean Air Act (CAA), National Emission Standards for Hazardous Air Pollutants (NESHAPS)
 (USC 7411, 7412; 40 CFR Part 61) Requirements for monitoring of air emissions must be met;
 activities will be carried out in a manner which will minimize potential air releases.
- Resource Conservation and Recovery Act (RCRA), Subtitle C Standards for Hazardous Waste Facilities (42 USC 6291 et seq.) - Soils and debris must be tested, and if hazardous, handled and disposed according to standards.
- Clean Water Act (CWA), Section 402, National Pollutant Discharge Elimination System (NPDES)
 (33 USC 1342; 40 CFR Parts 122-125, 131) Any discharges from the staged soils must be captured. Discharges into surface waters must meet ambient water quality criteria.
- Rhode Island Remediation Regulations (CRIR 12-180-001, Section 8; DEM-DSR-01-93, as amended August 1996 and August 2004) – Removal will be directed by presence of soil exceeding direct exposure criteria for residential use soil (lead >150 mg/kg)
- Rhode Island Clean Air Act Fugitive Dust Control (RIGL 23-23 et seq.; CRIR 12-31-05) –
 Actions must take reasonable precaution to prevent particulate matter from becoming airborne.
- Rhode Island Clean Air Act Emissions Detrimental to Persons or Property (RIGL 23-23 et seq.;
 CRIR 12-31-07) Actions must prevent airborne emissions of contaminants that may be injurious to humans, plant or animal life or cause damage to property.
- Rhode Island Clean Air Act Air Pollution Control (RIGL 23-23 et seq.; CRIR 12-31-09) Removal action air emissions must be monitored and emissions controlled if necessary.
- Rhode Island Clean Air Act Air Toxics (RIGL 23-23 et seq.; CRIR 12-31-22) Removal action air emissions must be monitored to assess compliance and operation and maintenance activities carried out in to minimize potential air releases. Navy contractors will conduct monitoring for dust and airborne lead during the removal operations.

• Rhode Island Hazardous Waste Management Standards for Treatment, Storage, and Disposal Facilities (RIGL 23-19.1 et seq.; CRIR 12-030-003) – Soils and debris must be tested, and if hazardous, handled and disposed according to standards.

5.0 REMOVAL ACTIONS TO BE CONDUCTED

This section provides a summary of the removal actions to be undertaken. The work will be conducted under a statement of work provided to the remediation subcontractor, as well as the subcontractor's work plan for excavation and disposal. This section does not detail the operations of the excavation, rather it provides guidelines within which the remediation subcontractor can operate.

5.1 OVERVIEW

The Removal Action for the site includes the excavation of lead contaminated soil, buildling foundation, and concrete footings and capping of a water supply line. The active work areas, identified on Figure 5-1, will be excavated to remove target structures and to find and remove all soil exceeding the Action Level of 150 mg/kg lead. As stated in Section 1, the excavation plan is intended to over-excavate areas where soil is contaminated so as to increase the likelihood of meeting cleanup criteria without need for returning. Excavated areas will then be backfilled with clean soil. These areas are described as follows:

- Soil containing lead at concentrations above 150 mg/kg will be removed from the area where
 found. Based on extensive sampling conducted, this area is anticipated to cover 12,000 square
 feet, extend up to 3 feet below ground surface and involve the removal of an estimated 900
 cubic yards of soil.
- The surface soil across the open area where the tower was laid down and cut apart will be scraped to a depth of six inches below ground surface. This will be conducted to assure that all paint chips that were dislodged from the tower during demolition are removed from the site. The surface soil removal is anticipated to impact an area approximately 25,000 square feet, extend to a depth of 6 inches below ground surface and involve the removal of approximately 240 cubic yards of soil and debris.
- The former Building 66 foundation and the four tower concrete footings will be excavated, demolished and removed from the subsurface. The foundation excavation is presumed to involve an area of 200 square feet, extend up to 5 feet below ground surface and involve removal of 200 cubic yards of soil and concrete. Lead contamination is not anticipated to be present in these deep soils, nor in the unpainted surfaces of the concrete.

- The water supply line leading to the foundation of the water tower heater building will be from the street will be cut and capped at the sidewalk area, east of the building foundation.
- The single utility pole located at the site will be disconnected, removed and disposed of. A
 transformer on the utility pole is marked as a non-PCB containing transformer and will be
 removed and returned to NAVSTA.

Waste characterization samples will be collected from the stockpiled soil for laboratory analysis to accurately determine the nature of contamination and, accordingly, the appropriate off-site disposal location. Waste characterization sampling is further described in Section 8 of this work plan.

Additionally, confirmation samples will be collected from the vertical and horizontal limits of each excavation area to demonstrate that the removal action objective has been achieved. If the confirmation sampling results indicate that non-compliant soil extends beyond the originally anticipated excavation limits, then excavation will continue under direction of the Navy and agreement by the regulatory parties. If the sampling results indicate that all remedial objectives have been achieved, then the excavation areas will be backfilled with clean imported common fill. Excavation will not be continued to the south into the paved area. If confirmation samples indicate the presence of soils exceeding criteria in this area, a second removal will be considered under a modification to the work plan. Confirmation sampling is further described below in Section 8 of this work plan; the specific construction activities to be conducted for completion of the work are delineated in Section 6.

5.2 ANTICIPATED TASKS

The following major activities (not necessarily in the order listed) will be performed:

- Mobilization
- Dig Safe clearance
- Surveying
- Installation of sedimentation and erosion control measures
- Tree, vegetation, and debris removal, as needed
- Construction of temporary wheel-wash and decontamination facilities
- Establishment of exclusion zones and contamination reduction zones
- Construction of temporary staging area
- Excavation of contaminated soil and subsurface structures
- Collection of soil samples for field screening, waste characterization, and confirmation of regulatory compliance

- Transportation and off-site disposal of contaminated media
- Transportation and disposal of general debris
- Backfilling of the excavated areas with imported common fill
- Reestablishment of vegetative cover where appropriate
- Demobilization

5.3 CONSTRUCTION QUALITY CONTROL

A Construction Work Plan (CWP) will be prepared by the Remediation Subcontractor for this project upon selection of that contractor. Construction quality control will include material testing, results documentation, reporting deficiencies, and certifying that all submittals are in compliance with contract requirements.

The project engineer will conduct oversight of the remediation Subcontractor to assure that the subcontractor adheres to the RA work plan, Construction Work Plan, the Subcontract Statement of Work, RIDEM Remediation Regulations, and other requirements. The oversight engineer will compile testing records, site documentation and maintain them on site until the completion of the removal action.

5.4 HEALTH AND SAFETY REQUIREMENTS

A site-specific Health and Safety Plan (HASP) will be provided Remediation Subcontractor to detail requirements to be utilized in the field for protection of worker health and safety. The SHSO will provide oversight of activities to ensure conformance with the HASP. The SHSO will be responsible for conducting site health and safety trainings and briefings, air and dust monitoring during operations, personnel monitoring, enforcing/modifying levels of personal protective equipment (PPE), ensuring compliance with decontamination procedures, maintaining monitoring equipment, and documenting and reporting all health and safety-related accidents or injuries.

The Health and Safety Plan is provided as Appendix A.

The SHSO will conduct regular site safety inspections. Weekly and monthly reports will be prepared and submitted to the Health and Safety Manager. Daily health and safety reports will also be prepared and submitted with the daily report.

The following components of the HASP will affect the daily activities of workers:

- A hazard assessment that identifies chemical, physical, and biological hazards associated with the project. Activity hazard analyses will be prepared to define the specific risks and means of mitigation associated with daily construction activities.
- Control measures to reduce the risk of exposure to chemical, physical, and/or biological hazards.
- Specific training requirements required for workers to operate at the site.
- Guidance regarding control of site operations, use of PPE, site safety equipment, and on-site communications
- Establishing and maintaining the exclusion zone
- Real-time air monitoring and medical surveillance procedures.
- Decontamination procedures, including contamination prevention, personnel decontamination, equipment decontamination, and disposal procedures.

5.5 PROCEDURES FOR DECONTAMINATION

This section describes the procedures that will be employed to ensure that both personnel and equipment are free from contamination when leaving the work site, either at the end of each day, during scheduled breaks, and/or upon completion of the project, when leaving a contaminated or potentially contaminated area and entering a clean one, and when completing a task involving handling contaminated material prior to beginning a clean task.

5.5.1 <u>Personnel Decontamination</u>

The following site activities will present the potential for personnel contamination:

- Excavation and stockpiling of soil and other waste material
- Decontamination of equipment

The Remediation Subcontractor will apply engineering and/or work practice controls as a means of protecting personnel during performance of site-specific tasks. Engineering controls will be implemented to reduce and maintain employee exposure at or below safe levels for those tasks involving possible

exposure to contaminants. When engineering controls are impractical or insufficient to protect employees during site operations, the Remediation Subcontractor will designate use of PPE to perform certain tasks.

Any personnel exposed to possible contamination during daily activities will follow decontamination procedures outlined in the HASP. Decontamination procedures will ensure that any material that workers may have contacted in the Exclusion Zone (EZ) does not cause personal exposure and is not spread to clean areas of the site. The EZ will be limited to work areas considered to be contaminated; this designation will be revised and updated daily as contaminated soils are exposed, removed, and removal areas are confirmed to be completed. Site restoration activities (backfill, grading, and seeding) will not require the use of decontamination or the use of PPE.

5.5.2 Equipment Decontamination

All contaminated equipment will be decontaminated when switching from a contaminated task to a clean one and prior to being demobilized from the site. Decontamination procedures may include sweeping, wiping, scraping, or steam-cleaning equipment, including reusable waste containers. Personnel performing decontamination tasks will wear the proper PPE as specified by the HASP. Off-site vehicles that travel through contaminated portions of the site will have their tires washed prior to exiting the site. The exteriors of the vehicles will also be inspected by the oversight engineer to assure that they are free of any contaminated soil.

5.5.3 Disposal

Decontamination solids and used PPE will be collected and disposed of at an approved off-site disposal facility. These materials will be sampled and characterized as required by the disposal facility prior to removal from the site. Decontamination liquids will be captured and stored on site. When all contaminated areas of the site have been remediated, decontamination liquids will be collected, placed in United States Department of Transportation (DOT)-approved 55-gallon drums or other acceptable field container, sampled, and disposed of at an approved off-site disposal facility.

5.6 SITE SECURITY/SITE ACCESS

The Construction Management Team will maintain security at the site by use of temporary and existing fences and gates across all entrances to the work area. These gates will be locked by Construction Management Team personnel at the end of each work day. Additionally, warning signs will be posted at the site entrance to deter people from entering. Access to the site will be monitored by use of a sign-in

sheet located in a temporary office trailer. Signs will be posted at the site entrance informing visitors to sign in upon arrival.

6.0 REMEDIAL CONSTRUCTION

This section provides a description of the major tasks that will be performed to accomplish the project. Tasks will be performed in accordance with the Action Memorandum, RA work plan, CQC Plan, and site-specific HASP.

6.1 MOBILIZATION

Temporary construction offices and facilities, lay down, staging, and material storage areas will be installed as part of the mobilization task. Temporary facilities may include an office trailer, washroom trailer, one or more storage containers, and portable toilets. Utility connections will be made for power, water, and telephone and internet communications. Utility work will be coordinated first with the public DigSafe and secondly with the Navy Public Works Department. Arrangements will be made for mail delivery and solid waste and sewage disposal services. Administrative staff, craft labor, and equipment will be mobilized to the site as part of this task.

6.2 SITE PREPARATION

6.2.1 <u>Erosion and Sedimentation Controls</u>

Prior to site disturbance, the Remediation Subcontractor will prepare a limited Stormwater Pollution Prevention Plan, which will include a description of how the soil erosion and sediment control devices will be constructed. Silt fence will be installed along the perimeter of active excavation areas, and along the downgradient and lateral gradient sides of the temporary staging area. Additionally, stormwater diversion swales will be constructed as necessary upgradient of the work areas and staging area to prevent surface water from flowing into these areas.

6.2.2 Site Preparation

The Remediation Subcontractor will remove trees and stumps within the work areas. Cut trees will be removed form the site entirely, either chipped or in whole. Stumps and root balls will be segregated and handled in the same manner as the other excavated materials.

The Remediation Subcontractor will remove fencing material as needed for completion of the work. The Remediation Subcontractor will restore any fencing removed at the completion of the project to the original extent and condition prior to removal. The Remediation Subcontractor will fence-off (block) the existing path along West Main Rod (Route 114) for the duration of site work.

6.2.3 Decontamination Facilities

Personnel and equipment decontamination facilities will be established. The personnel decontamination facility will consist of an area where personnel can don proper PPE prior to entering the EZ and remove the PPE prior to exiting. The area will be clearly marked with high visibility tape and/or fencing. The equipment decontamination facility may consist of a 2- to 4-inch stone layer approximately 15 feet wide by 20 feet long, or similar arrangement. Equipment will be walked on to the layer of stone and pressure-washed prior to exiting the EZ. The equipment decontamination facility will provide a means of capturing contaminated wash water and soil so as to prevent the spread of contamination to nearby properties.

6.3 STAGING AREA PREPARATION

The Remediation Subcontractor will set up a site staging area, decontamination areas and entrances and exits into the site from the staging area. The Remediation Subcontractor will be allowed to use the Melville Elementary School south parking lot as the staging area and for entrance to the work areas. Entrances and exits to the staging area will be accessed by using the south drive of the school to West Main Road (Route 114).

No soil will be staged or stored on school property at any time. The staging area will be provided with adequate containment of possible runoff and erosion during the anticipated period of staging. Any areas used and damaged will be repaired at completion of the project.

6.4 CAPPING OF EXISTING PIPELINE

The Remediation Subcontractor will locate the existing underground water pipeline where it enters the site, cut that pipe as close as possible to town water connection, cap the pipeline, install a thrust block, and then backfill and restore this area. It is not anticipated that the remnant pipe remaining in the ground will be removed unless the soil removal effort warrants it.

6.5 EXCAVATION

The removal action will consist of four components, as described below. Figure 5-1 shows the target excavation areas.

6.5.1 Soil

The subcontractor will conduct excavations guided by the sampling grid established by TtNUS in 2006, as shown on Appendix C. Figure 5-1 depicts excavation areas A, B, C, and D, as determined using sample

data from this grid. Excavation areas are overestimated to as to reduce the likelihood of not meeting cleanup goals in the confirmation samples collected.

Area A - Soil will be excavated in Area A to 2 feet below ground surface. Confirmatory sampling for total lead will be conducted. This material is assumed to contain soil exceeding RCRA C criteria for TCLP lead. Confirmation samples will be collected as stated in Section 9.2. Confirmation samples that exceed 1,000 mg/kg total lead will indicate that excavation of area A will continue as described in Section 9.2. Only samples exceeding the 1000 mg/kg criteria will indicate the presence of RCRA C soils and require additional excavation of Area A. Excavation of Area A will require excavation around the existing foundations of the heater building and the tower footings. Soils from Area A will be loaded directly into trucks bound for disposal facilities, and will not be stockpiled.

Area B – Area B will be excavated to a total depth of two feet below ground surface. Confirmatory sampling for total lead will be conducted. This material is assumed to contain soil that will be classified as RCRA D, with elevated concentrations of lead >150 mg/kg, < 1,000 mg/kg lead. Confirmation samples that exceed 150 mg/kg lead will indicate that excavation of area B will continue as described in Section 9.2. Only samples exceeding the 150 mg/kg criteria will require additional excavation of Area B. Excavation of Area B will also require excavation around the existing foundations of the heater building and the tower footings.

Area C – Area C will be excavated to a total depth of two feet below ground surface. Confirmatory sampling for total lead will be conducted. This material is assumed to contain soil that will be classified as RCRA D, with elevated concentrations of lead >150 mg/kg, < 1,000 mg/kg lead. Confirmation samples that exceed 150 mg/kg lead will indicate that excavation of area C will continue as described in Section 9.2. Only samples exceeding the 150 mg/kg criteria will require additional excavation of Area C. Excavation of Area C may require excavation around the existing foundations of the heater building and the tower footings.

Area D – Area D will be excavated to a total depth of six inches below ground surface. Confirmatory sampling for total lead will be conducted, and the bottom of the excavation will be inspected for visible paint chips. This material is assumed to contain soil that will be classified as RCRA D, containing lead paint chips. Confirmation sampling will be required at area D, in accordance with Section 9.2.

As foundations are exposed, soil will be removed by brushing, and sweeping to eliminate the need to decontaminate them when they are demolished.

6.5.2 Foundations

The former Building 66 foundation and the four tower concrete footings will be demolished, and removed from the subsurface. All foundations in the excavation area will be removed as directed. Material size will be reduced for transportation and disposal on the site as needed and all loose soil will be removed from material on-site prior to transportation. Approximate foundation dimensions are:

Tank Foundations: Four each, pyramid shaped, concrete with top 2.5 foot by 2.5 foot, bottom 7.5

foot by 7.5 foot, 6.5 foot deep

Building Foundation: 64 lineal feet by 4 foot deep

Former Pipeline Riser Support Block: 5 foot wide by 10 foot long by 4 foot deep

Building Floor: 240 square feet by 0.5 foot thick

Refer to Navy drawing 5933-66, provided as Appendix B for more information.

6.6 STAGING OF EXCAVATED MEDIA

No stockpiles of soil are to remain on site overnight. All excavated soil must be transported off site the day of excavation. The Remediation Subcontractor will crush or reduce large size material to manageable sizes for transportation to the Storage Area as needed.

The Remediation Subcontractor will establish a Storage Area at Tank Farm 5 Naval Station Newport, approximately 4½ miles from the excavation site. All non-hazardous excavated materials may be stockpiled in this area prior to characterization. No hazardous materials are permitted at the Storage Area. Soil from Area A will be shipped immediately to the disposal facility.

The Storage Area, will be prepared with a base of plastic or geotextile to place the materials on. Any material placed in the Storage Area will be covered at all times to prevent intrusion of rain, and to prevent erosion by precipitation and wind. The covering systems will remain intact until all material is removed/disposed off site. All material placed in the storage area will be removed by September 28, 2007.

6.7 OFF-SITE DISPOSAL

Approximately 1,200 cubic yards of excavated soil and approximately 50 cubic yards of foundation materials will require transportation and offsite storage and disposal. All disposal quantities are estimated

quantities subject to change based on analytical results of the material reported by the Remediation Subcontractor.

The following material is anticipated to require transportation and disposal:

- Soil containing lead in excess of Rhode Island Direct Exposure Criteria (>150 mg/kg lead).
- Material that is characterized as RCRA hazardous due to TCLP leachable concentrations of 5 mg/L or greater of lead.
- Root balls from trees cut as described elsewhere in this SOW.
- Demolition debris including concrete and asphalt.
- Decontamination fluids and solids generated.

6.7.1 <u>Traffic and Haul Routes</u>

Transportation vehicles will enter and exit the site through the southern school entrance. Truck traffic will arrive and leave the site only between working hours to comply with security inspection requirements and to minimize disturbance to local residents and businesses.

The Subcontractor will adhere to off-site haul routes as described in the Traffic Plan.

6.7.2 Liners and Tarps

All off-site disposal trucks will be equipped with appropriate appurtenances (e.g. liners and tarps) in proper working condition. All loads will be covered prior to departure. Liners will be required for trucks transporting hazardous waste, and truck beds will be checked to properly seal when closed. The Remediation Subcontractor will ensure that all liners and covers are properly secured and that the vehicles are not leaking or releasing any waste constituents at any time.

Drivers of the off-site disposal trucks must not come in physical contact with the contaminated material while covering the load or preparing it for transport. Off-site disposal trucks will be loaded in an area designated by the oversight engineer, and clearly marked at the site.

6.7.3 Documentation

The Subcontractor will be responsible for providing and carrying waste manifests, bills of lading, placards, labeling, markings, licensing, and any other transportation/disposal documentation as required by federal, state, and local regulations. The Navy will supply an EPA Generator ID number for this documentation.

A representative of the Navy will sign completed shipping manifests and bills of lading. TtNUS will coordinate with the local Navy representative and schedule review and signature of manifests and bills of lading. TtNUS will provide the Navy with a minimum of 48 hour notice (business days) prior to shipping waste materials from the site.

6.8 SITE RESTORATION

Upon completion of work, all excavated areas on-site and all disturbed areas at the Storage Area will be restored as described below.

6.8.1 Landscaping Materials and Testing

All restoration material will be obtained from off-site sources. No material is available at the Site or at NAVSTA Newport.

Fill will be sandy gravel, free of organic material, loam, wood, trash, and other foreign or deleterious material and will have the following gradation:

Sieve Size	Percent Finer by Weight
4-in	100
No. 4	20 - 70
No. 40	5 - 35
No. 200	0 - 7

Topsoil will conform to the applicable requirement of Section M.18.02 Plantable Soil; Landscaping Material of the Rhode Island Department of Transportation (RIDOT) Standard Specifications for Road and Bridge Construction.

Seed mixture will conform to the applicable requirement of Section M.18.09 Park Mix; Landscaping Material of the RIDOT Standard Specifications for Road and Bridge Construction.

Lime, fertilizer, mulch and water will conform to the applicable requirement of Section M.18; Landscaping Material of the RIDOT Standard Specifications for Road and Bridge Construction.

All soils brought to the site will be certified as clean materials, with contaminant concentrations not exceeding RIDEM Direct Exposure Criteria for residential use soils (DEM DSR-01-93, Amended February 2004, Section 8.02). In addition, offsite soils will contain less than 100 ppm total petroleum hydrocarbons (TPH) (EPA Method SW-846 Method 8015M) and less than 10 ppm of the sum of benzene, toluene, ethylbenzene and xylenes (BTEX) (EPA Method SW-846 Method 5030/8020). Materials will not be brought on site until test results are approved by TtNUS.

6.8.2 Grading

The excavation areas and other disturbed areas will be graded to an approximate pre construction grade elevation with compacted select fill, topsoil and turf, as described below:

- Grade the excavated areas to the grades prior to excavation.
- Place fill in loose lifts and compact to a 8-inch thick layer.
- Following fill application, place topsoil a 4-inch thick minimum layer to finished grade.
- Restore to original condition turf areas that have been disturbed and damaged (ruts or scarring in the soil) during excavation using topsoil.
- Restore areas by revegetating in accordance with Soil Preparation and Seeding (Section 2.13.3.
- Protect revegetated areas from pedestrian and vehicular traffic using signs and/or temporary barriers.
- Maintain or install new appropriate erosion and sediment control measures.

6.8.3 Soil Preparation and Seeding

Topsoil will be spread and dressed to finished grade leaving no irregularities or depressions and so as to promote positive drainage. Revegetation will occur within 24 hours of topsoil placement. The area to be revegetated will be prepared, limed, fertilized, seeded, mulched and watered as a Type 1 (General Highway Seeding) area in conformance with Section L.02 Seeding of the RIDOT Standard Specifications for Road and Bridge Construction.

Seeding will be provided at a minimum rate of 150 lbs per acre, through hydroseeding or mechanical means, with mulch and fertilizer added as necessary. Fertilization will be provided at no more than 850 lbs per acre.

All seeded areas will be watered within 72 hours of placement of the seed, and a second watering will be conducted approximately 72 hours after the first. Water will be applied at a controlled rated and in such a manner to insure that the water reaches the root zone. Water operations will not flood adjacent areas, erode soil seed, mulch or fertilizer, or cause damage to the seeded areas.

The minimum coverage of new sown seed will be 85% of the area seeded, to a mown height of 4 inches. The temporary staging area will be restored by removing the 40-mil polyethylene liner and silt fence for disposal as solid waste. Any fencing, gates, and site access roads will be removed or restored as required by the Navy.

6.9 DEMOBILIZATION

All equipment, supplies, materials and facilities brought to the site during their work will be removed from the site no later than August 24, 2007. All equipment, supplies, materials and facilities brought to the Storage Area during their work will be removed no later than October 5, 2007.

As a part of demobilization, the Subcontractor will repair any areas used and damaged to their original condition at completion of the project at no cost. The subcontractor will replace any fencing, permanent or temporary, that has been moved or damaged during the work performed.

6.10 DUST CONTROL

Dust control measures will be implemented, as necessary, during all construction activities. Water will be applied by a water truck to work areas and access roads as often as required to prevent visible dust threshold emissions. Additionally, routine dust monitoring will be performed in accordance with the Site Specific HASP.

7.0 MATERIAL HANDLING

The following material handling protocols will be implemented during this Removal Action to prevent contaminated soils from coming in contact with clean areas:

- Prior to leaving the excavation area, the exterior of each truck will be inspected to ensure that no loose soil is present.
- The Remediation Subcontractor will establish a system for tracking soil stockpiles and associated sample results.
- All off-site disposal trucks will remain on the clean haul road at all times. If an off-site disposal
 truck is required to travel through a contaminated section of the site, its tires and wheel wells will
 be pressure-washed prior to leaving the site.
- Any vehicle or piece of construction equipment that contacts a contaminated section of the site
 will be decontaminated prior to entering clean sections of the site.

8.0 SAMPLING ACTIVITIES

8.1 BASELINE SAMPLING

Surface and subsurface samples were previously collected to determine the extent of the removal action

area; therefore baseline sampling prior to commencement of the work is not necessary.

8.2 CONFIRMATION SAMPLING

Confirmation sampling will be performed at the excavation areas to demonstrate that the Removal Action

objectives have been achieved. Confirmation sampling will begin once the contaminated soils have been

excavated to their planned horizontal and vertical extents. Confirmation sampling locations and results

will be used to confirm that the project objectives have been achieved within each area. Where

excavation areas share boundaries, the lower criteria will apply.

Applicable criteria for confirmation samples are as follows:

Area A - 1000 mg/kg lead

Area B - 150 mg/kg lead

Area C - 150 mg/kg lead

Area D – 150 mg/kg lead and no visible paint chips present.

Confirmation samples at areas A, B, and C will be collected at a spacing of 20 linear feet on each

sidewall, and at the bottom of the excavation on a 10 foot grid. Exceedance of applicable criteria will

require excavation to continue an additional five feet horizontally (if side wall is exceeded) and one foot

vertically (if bottom sample is exceeded).

Confirmation samples at area D will be collected on a grid of the bottom of the excavation, one sample

every 25 feet, using the original grid shown on Figure 5-1 (extended to the south and west as needed),

and one sample every 20 linear feet on each side wall.

Each confirmation sample will be collected as a minimum three point composite.

• Side wall samples: The composite sample will be taken by obtaining soil aliquots along a vertical

transect from the bottom to top of excavation. Aliquots will be representative of the entire height

of the side wall.

Bottom samples: The composite sample will be taken by obtaining 3 soil aliquots within three feet
of the associated grid point, with the sample collected to a depth of two inches below the
excavated grade.

The grid coordinates for each sample location will be recorded.

Confirmation samples will also be analyzed for arsenic, cadium, and chromium for informational purposes.

Confirmation soil samples will be submitted for chemical analysis of total lead per SW-826, Method 6010B with a maximum 48-hour turnaround analysis to a laboratory certified in the state of Rhode Island. All metals results for each area of concern will be provided to TtNUS for review. No sampling of the portions of the excavation sidewalls that are common boundaries between two areas of concern will be samples, as the material will be excavated. Re-sampling in accordance with this section will occur after additional excavation. The process will be repeated until compliance is achieved for all excavation areas in accordance with this work plan.

Compliance with the soil Removal Action objective will be achieved when all confirmation sample results demonstrate that soil contamination in excess of the applicable regulatory criteria has been successfully excavated and removed off-site. The process will be repeated until compliance is achieved for all excavation areas in accordance with this work plan.

8.3 WASTE CHARACTERIZATION SAMPLING

The Remediation Subcontractor will conduct the following minimum sampling for waste characterization. In addition, other sampling may be conducted as required by the disposal facilities.

• For every 125 cubic yards of soil, sub-sample will be collected from at least four areas and composited as a representative sample of that 125 cubic yard portion.

The Remediation Subcontractor's analytical laboratories will provide results to TtNUS within five days of collection. The Remediation Subcontractor will retain copies of all sample results on site until the completion of the project.

The Remediation Subcontractor will profile the material for the disposal facilities based on laboratory analytical data that they generate, and prepare all transportation documentation, including Bills of Lading, Manifests etc. for signature by the Navy.

9.0 REGULATORY COMPLIANCE

9.1 STORMWATER DISCHARGE FROM CONSTRUCTION ACTIVITIES

The construction activity at the site is anticipated to result in disturbance of less than 1 acres of ground area; therefore, obtaining a National Pollution Discharge Elimination System (NPDES) Stormwater Permit for Construction Activities is not required. The project is not governed by specific effluent limitation or monitoring requirements, however no discharge of hazardous substances to surface water will be permitted. A stormwater management plan will be prepared by the remediation contractor and adhered to during work performed on site.

9.2 EARTH MOVING OPERATIONS

All excavation, grading, and earth-moving operation will be conducted in accordance with the Stormwater Management Plan prepared by the Remediation Subcontractor.

9.3 AIR POLLUTION CONTROL

9.3.1 Fugitive Dust and Odor Emissions

A no visible dust emission rule will apply to this project site.

During excavation, sit to the spread of dust from surface soil that may contain elevated concentrations of lead will be minimized. Excavated areas will be pre-treated with water to suppress dust in the excavation area. The accessways and staging areas will be protected with heavy-duty coverings, maintained as need to prevent impact to the parking areas.

Perimeter dust monitors will be used to determine non-visible emissions from the site. Airborne lead monitoring may be conducted in accordance with the Site HASP. At a minimum, total dust samples will be collected at the fence line and downwind locations.

9.4 WASTE MANAGEMENT

All excavated materials will be disposed off-site in accordance with the RIDEM Solid and Hazardous Waste Regulations. Similar wastes will be stockpiled together, sampled, and analyzed to determine the appropriate waste classification. Waste materials potentially not suitable for stockpiling include liquid

wastes and drums containing liquid. Groundwater encountered during the excavation activities will not be considered liquid waste.

The following waste materials will be generated during remedial activities:

- Construction debris containing lead
- Potentially contaminated vegetative waste generated during site clearing activities
- Uncontaminated above-grade vegetative waste generated during site clearing activities
- Subsurface structures
- PPE consisting of Tyvek, booties, gloves, etc. from intrusive activities in the EZ
- Decontamination solids and liquids

All disposal facilities and transporters involved with off-site disposal will be approved by the Navy in advance. All necessary waste documentation (profiles, bills of lading, hazardous waste manifests) will be prepared for Navy review and signature.

9.4.1 Excavated Wastes

Wastes found to be characteristically hazardous as defined by RCRA will be disposed of at an out-of-state RCRA-permitted hazardous waste facility. Non-hazardous wastes will be landfilled at a non-hazardous solid waste landfill located nearby.

9.4.2 Construction and Demolition Debris

Construction and demolition debris consisting of wood, concrete, metal and/or other materials may be generated during excavation activities. This debris will be broken into manageable pieces, as necessary, and stockpiled for waste classification sampling and disposal. Off-site recycling of metal debris may be considered a more cost-effective option if the cost to source, separate, and handle the debris does not outweigh the cost difference for landfill disposal as commingled waste. Paint will be removed from the concrete prior to disposal. Sampling and analysis of the waste material will be conducted as necessary in accordance with this work plan.

9.4.3 Uncontaminated Vegetative Waste

Uncontaminated vegetative waste generated from surficial clearing activities will be shipped off-site.

9.4.4 Potentially Contaminated Vegetative Waste

Potentially contaminated vegetative waste generated from below-grade grubbing operations in potentially contaminated areas will be chipped on-site and stockpiled with other site wastes pending waste classification sampling and off-site disposal.

9.4.5 <u>Personal Protective Equipment</u>

PPE (Tyvec, gloves, booties, etc.) generated in the EZ during intrusive work will be placed in roll-off containers and sampled for waste characterization analyses. Non-hazardous PPE will be disposed off-site at a RCRA-permitted Subtitle D solid waste landfill. Hazardous PPE will be disposed at a RCRA-permitted Subtitle C hazardous waste facility. PPE sampling will be conducted in accordance with this work plan. PPE generated during clean work activities will be considered clean and disposed off-site as non-hazardous solid waste at a RCRA-permitted Subtitle D solid waste landfill.

9.4.6 <u>Decontamination Solids</u>

Decontamination solids generated from decontamination of equipment previously in contact with site wastes will be stockpiled with similar wastes pending waste characterization sampling and analysis, and ultimately disposed off-site in either a RCRA-permitted Subtitle D solid waste facility or Subtitle C hazardous waste facility.

9.4.7 <u>Liquid Wastes</u>

Potential sources of liquid waste on-site include decontamination water. Decontamination fluids and solids will be captured daily, and stored on site then characterized and disposed of off-site at an approved waste facility.

9.4.8 RCRA Waste Classification

Materials will be classified as RCRA hazardous waste (40 CFR 261.11) if they are (1) a listed waste under 40 CFR 261.31, .32, and .33, or (2) characteristic for ignitability (D001), corrosivity (D002), reactivity (D003), or toxicity (D004-D043) as defined in 40 CFR 261.21, .22, .23, and .24. Waste analysis will occur at the frequency specified in this work plan. Some soils have previously been characterized by TtNUS; therefore, disposal facilities may be pre-selected by the Remediation Subcontractor.

9.4.9 Solid Waste Classification

Solid wastes are those materials defined by 40 CFR 262.1 as drilling wastes, garbage, refuse, sludge, and other discarded materials including solid, liquid, semi-solid, or contained gaseous material generated by industrial, commercial, or agricultural operations or from community activities. Site-generated solid wastes that exhibit no RCRA characteristics will be regulated as non-hazardous and disposed of in a RCRA-permitted Subtitle D solid waste facility. All Subtitle D solid waste facilities used for off-site disposal will be first reviewed by the Navy and subject to Navy approval.

9.4.10 Permitting and Approval Requirements

The Remediation Subcontractor will be responsible for obtaining approval for disposal from the off-site facilities. The Navy is responsible for obtaining RCRA Notification of Hazardous Waste Activity forms and a Generator's Hazardous Waste Number. The Remediation Subcontractor will assist the Navy in completing and submitting all necessary permits, as requested.

9.4.11 Waste Minimization

Waste minimization principles will be incorporated into the project as follows:

- All planning activities will incorporate waste minimization practices.
- Waste streams will be segregated.
- Materials will be reused/recycled where possible.
- Use of hazardous materials will be minimized.
- Materials will not be contaminated unnecessarily.
- Equipment will be decontaminated and reused when practical.
- Hazardous materials will be subject to strict inventory controls.
- Using dedicated equipment, minimal amounts of IDW will be generated.

Each of the above steps will reduce the amount of contaminated waste generated during the project. Site inspections will be conducted to monitor site compliance and waste minimization activities.

9.4.12 Segregation/Screening

Waste will be segregated based on existing information including the waste location, potential chemical composition, appearance, odor, and field monitoring results. Similar wastes will be consolidated together for waste characterization sampling. Non-hazardous waste will be segregated from hazardous waste.

Waste segregation practices are intended to facilitate waste classification, minimize treatment and disposal costs, and match the acceptance criteria of off-disposal facilities.

9.4.13 Containerization

Characterized wastes will be placed in DOT-compliant containers for off-site disposal. Bulk and non-bulk containers will be used based on waste volumes. Lined dump trailers and roll-off containers will be used for large volumes of waste including soil, debris, and PPE wastes. Smaller volumes of waste such as decontamination water will be stored in non-bulk containers pending off-site disposal. DOT-specified 1A1 (closed top) and 1A2 (open top) steel drums will be suitable for non-bulk waste streams such as non-decontamination water.

9.4.14 Storage

No soil stockpiles will remain on site overnight. All excavated soil must be transported off site the day of excavation. Large size material will be reduced to manageable sizes for transportation to the Storage Area as needed.

The storage area will be prepared and used as described in Section 6.3.

The Remediation Subcontractor will be responsible for the waste accumulation/storage area, and will be responsible for coordinating any emergency response activities related to waste storage area spills or releases. The following information will be posted at the waste accumulation area at all times:

- Name and telephone number of emergency coordinator
- Location of fire extinguisher and spill control materials
- Telephone number of fire department
- Signage stating "Authorized Personnel Only"

9.4.15 <u>Container Inspections</u>

Waste container accumulation areas will be inspected weekly by project personnel while the work is in progress to ensure proper labeling and secure closure and assess the condition of each container, the number of containers, and the condition of the storage area. Any signs of deterioration, leaking, or dents will be noted and the containers will be immediately overpacked, if necessary. Inspection results will be documented in writing and the date and time of inspection and the inspector's signature will be provided on each inspection log.

9.4.16 Container Marking and Labeling

At the time of generation, all waste containers will be marked in indelible ink, paint, or grease pencil with the following information:

- Source and location
- Contents of the container (type of material and expected hazards)
- Accumulation start date (the date material was first put in the container)
- Date container was sampled
- Special handling instructions
- "Hazardous Waste" label (for known or suspected hazardous waste)

Upon receipt of analytical results, containers will be immediately labeled with commercially available labels. Within 5 days of receiving analytical results, project personnel will contact the Navy if the waste is determined to not be hazardous. After concurrence from the Navy, the hazardous waste label will be removed and the container will then be relabeled with a "Non-Hazardous Waste" label. Based on final classification, the Remediation Subcontractor will select a proper DOT shipping name for any material meeting a DOT hazard class. The Remediation Subcontractor will direct application of any required DOT markings and labels specific to the proper shipping name. The Remediation Subcontractor will also specify required placarding based on the proper shipping name selected. Completion of the EPA Hazardous Waste Label will meet the DOT requirements for cosignor/cosignee, name, address, and contents.

9.4.17 Spill Prevention Procedures

The Remediation Subcontractor will take all necessary precautions to prevent the possible release of contaminants to the environment during all phases of the Removal Action. In the event of a spill, the Remediation Subcontractor will perform the following at a minimum:

- Immediately notify TtNUS and the Navy.
- Address and adhere to federal and state requirements for reportable spills.
- Take immediate measures, utilizing properly protected personnel, to control and contain the spill.
- Isolate the hazardous area and keep all unnecessary personnel out of the area.
- Stay upwind and out of low areas.
- Keep combustibles away from the spill materials.
- Use water spray or other approved methods to reduce vapors, gases, and/or dust emissions.

9.4.18 <u>Manifest Packages</u>

Both hazardous and non-hazardous waste will be generated during this project. Since the State of Rhode Island has its own Hazardous Waste Manifest, the Rhode Island Manifest will be used unless the waste-receiving state has its own manifest requirements. Non-hazardous waste will be shipped with a bill of lading or non-hazardous waste manifest. The principal components of the completed manifest packages submitted to the Navy may include:

- Hazardous waste manifests
- Hazardous material shipping papers
- Waste profile sheets

Supporting information will include:

- Waste disposal history
- Analytical results
- Material Safety Data Sheets
- Information reviewed in identifying the proper waste code
- DOT-specified waste packaging, labeling, marking, manifesting, and placard requirements

The Remediation Subcontractor will prepare the complete manifest package including waste characterization, waste profiles/approvals, and manifests/bills of lading.

The Remediation Subcontractor will submit to the Navy for review and signature a reproducible copy of the complete manifest package for each individual waste stream as soon as possible after waste classification and disposal facility approvals have been obtained. The Navy will be responsible for signing all hazardous waste manifests and bills of lading for off-site waste shipments. The Remediation Subcontractor will hold the original complete manifest package and make corrections based on Navy comments, prior to off-site shipment.

Within 24 hours of obtaining a transporter signature and shipping waste materials off-site, the Remediation Subcontractor will provide the Navy with two copies of the manifest (signed by the generator and original transporter) and the remainder of the approved complete manifest package.

No waste will be transported prior to obtaining Navy approval of the complete manifest package and Navy signatures for the manifests and shipping documents. The Remediation Subcontractor will not sign waste

profiles or manifest packages without written authorization from the Navy and approval of internal legal counsel.

Under RIDEM regulations, two copies of each manifest must be sent to the RIDEM. The Remediation Subcontractor will provide the Navy with all generator copies of the signed manifest. The Navy is responsible for submitting one required copy to the RIDEM. The second required copy will be sent to the RIDEM by the Treatment, Storage, and Disposal Facility (TSDF) after the TSDF has signed the manifest.

9.4.19 Record-Keeping Requirements

Records to be retained include all hazardous waste manifests, Generator Biennial Reports, manifest exception reports, bills of lading, records of any test results or waste analyses, waste profile sheets, and meeting notes and minutes, etc.; records will be retained for at least three years after project completion. Photocopies of all waste documentation will be retained in the project file. Original copies of manifests and bills of lading will be provided to the Navy.

9.4.20 Exception Reports

If, by the 35th day after the transporter signs the manifest, the Navy has not received a signed copy of the signed manifest from the TSDF, the Remediation Subcontractor will contact the TSDF by telephone to obtain a signed copy. If the Navy has not received a signed copy of the manifest by the 38th day, an exception report will be prepared. This exception report will be submitted to the Navy for review and approval no later than day 40. The Remediation Subcontractor will document all calls to locate shipments and submit the documentation with the exception report. The Navy will submit the signed exception report to the EPA Regional Administrator prior to the 45th day. All exception reports will also be presented in the Closure Report.

9.5 DOT HAZARDOUS MATERIAL TRANSPORTATION

Waste materials destined for off-site disposal are expected to be both hazardous and non-hazardous. The Remediation Subcontractor will adhere to the applicable requirements for waste and sample shipment. Hazardous materials will be properly classed, described, packaged, marked, labeled and conditioned for shipment as required by 49 CFR 171.

Waste that does not exhibit any of the nine DOT hazard class characteristics (i.e., explosive, flammable, poisonous, combustible, etc.) is not regulated under DOT specifications for transportation of hazardous material. If waste is suspected to be hazardous, then it will be shipped under the suspected hazard class.

If a particular hazard class is unable to be determined, then the material may be shipped under either of the following:

Shipping Name	Hazard Class	ID Number	Packing Group	Label
Environmentally hazardous substances, liquid, n.o.s.	9	UN3082	III	CLASS 9
Environmentally hazardous substances, solid, n.o.s.	9	UN3077	III	CLASS 10

When using either one of these "n.o.s." (not otherwise specified) shipping names, at least two technical names must follow (i.e., "Environmentally hazardous substances, liquid, n.o.s. [Benzene and Acetone]").

The shipping name, identification number, packing group, instructions, cautions, weights, EPA waste code numbers, and cosignee/cosignor designations will be marked on the packages for shipment. The label will provide information regarding the DOT hazard class.

The label to be placed on the material will depend on the results of the sampling. Once the waste is characterized, reference should be made to the Hazardous Materials Table in 49 CFR 172.101 to determine the appropriate label. The package (or drum) will be marked and labeled as specified in 49 CFR 172.301.

The person presenting hazardous material for shipment will offer placards (49 CFR 172.506). Any quantity of material listed in Table 1 of the regulations will be placarded. However, if there is less than 1,000 pounds of a Table 2-listed material, no placard is required. Class 9 placards are not required for domestic shipments. If a placard is required, the label referenced above will be affixed on each side and end of the vehicle.

Hazardous material shipment papers will include the following information about the material, in the following order:

- Proper shipping name;
- · Hazard class or division;
- Identification number;
- Packaging group;
- Total quantity (listed either before or after the above information); and
- Technical and chemical group names, which may be entered in parentheses between the proper shipping name and hazard class or following the basic description (e.g., "Flammable liquids, n.o.s. [contains xylene and benzene], 3 UN1993, PG II').

Other required information includes:

- EPA identification (applicable to manifests);
- Emergency Response Guidebook numbers;
- 24-hour emergency response number, supplied by the generator;
- Signatures; and
- Shipper's certification.

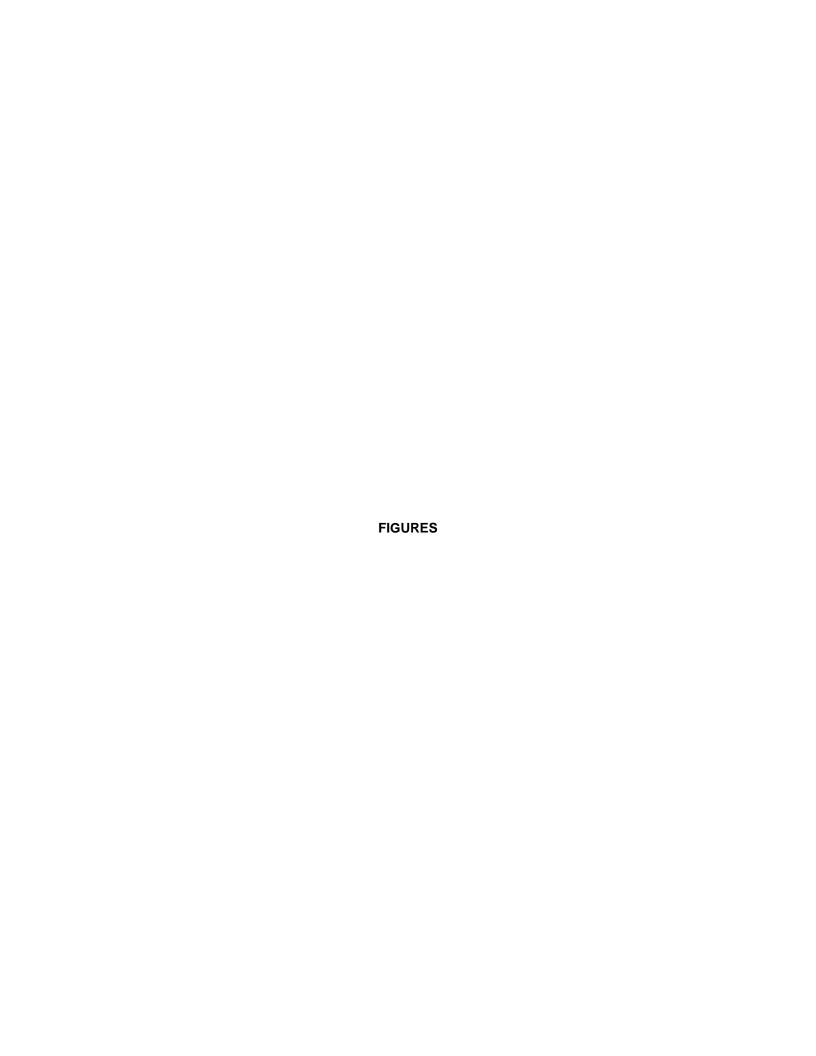
All Remediation Subcontractor personnel involved in DOT Hazardous Material Shipment activities will have been trained in accordance with personnel training requirements outlined in 49 CFR 172 Subpart H.

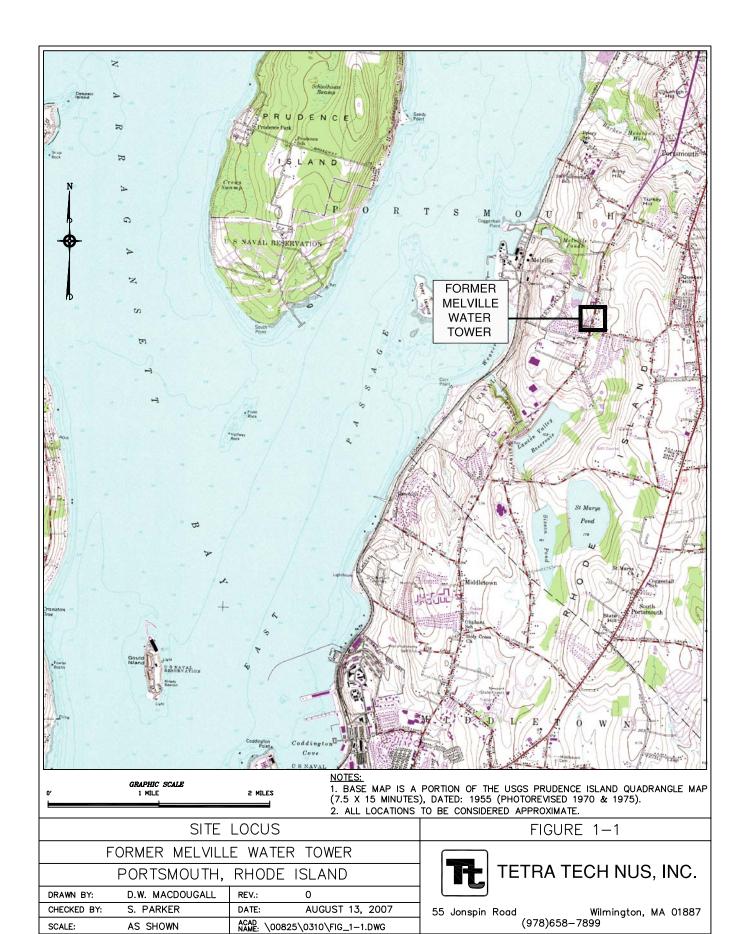
To ensure safe transport of the waste, only transporters who have demonstrated competence and hold the required license and permits for transporting will be used. Transporter EPA/state identification numbers will be kept in project and compliance files.

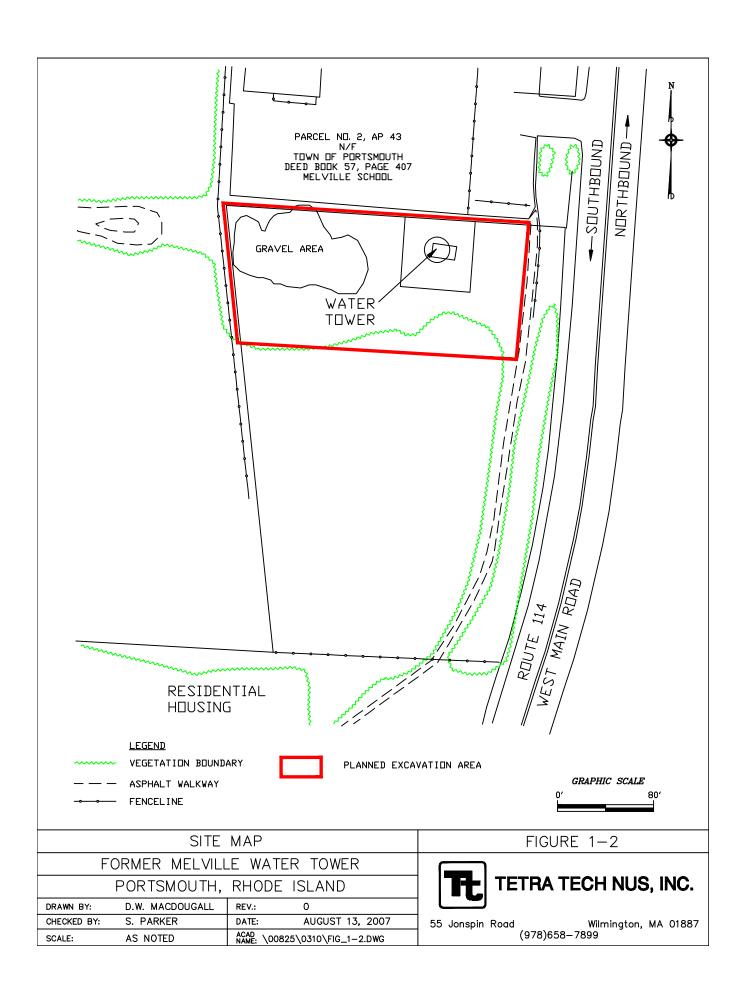
10.0 REPORT

Upon completion of the work, the TtNUS will prepare and submit a Closure Report to document the Removal Action that was conducted fulfill the requirements of the Action Memorandum. The report will contain a description of the Removal Action, summary of field screening activities, confirmation sampling and waste characterization analytical results, field QC inspection reports, weekly progress reports, manifest records for all material shipped and disposed off-site, photographic documentation of the project work, an estimated final cost, and statement from the Navy indicating that the work is acceptable. The report will also contain a signed statement from the Professional Engineer in charge of the project to certify that the work has been completed in accordance with the applicable regulations and policies. The Closure Report will be submitted as Draft for Navy review within 60 days of completing the site work.

The Navy will provide comments to the draft. After revision, the Closure Report will be provided for EPA and RIDEM review and comment, and then will be revised as final.









PREPARED BY: S. PARKER	EXISTING SAMPL	E STATIOI	NS AND E	EXCAVATION	PLAN					
CHECKED BY: S. PARKER	FORME	R MELVILI	LE WATER	TOWER						
	PORT	PORTSMOUTH, RHODE ISLAND								
	SOURCE:	RASE DIANI	BY SEE NOTE	·c						
	SCALE: AS NOTED	DATE: AUGUST	14, 2007	PROJ. NO: 00825						
PROJECT MANAGER: S. PARKER	DRAWING NO:		ACFILE NAME		TREV:					
PROGRAM MANAGER: J. TREPANOWSKI			\00825\0310\EX		0					
		•								

55 JONSPIN ROAD WILMINGTON, MASSACHUSETTS 01887 (978)658-7899

DRAWN BY: D.W. MACDOUGALL

NOTES AND REFERENCES:

DRAWING NO. 20070602-01

TETRA TECH NUS, I	NC
-------------------	----

CONC. RAMP ASPHALT TBM SET MAG NAIL EL.=161.3 (SEE NOTE 3) ~~~~ ASPHALT CONC. UTILITY
(POSSIBLE VALLT) A 0+25 A 0+50 A 1+50 SS TER VULT APPROXIMATE OVERHEAD WIRES 1 APPROXIMATE Q E 0+00

MELVILLE ELEMENTARY SCHOOL

MELVILLE ELEMENTARY SCHOOL

TREE LINE

CHYDRANT

<u>LEGEND:</u>

GUARD RAIL

DOUBLE GUARD RAIL

----- CHAIN LINK FENCE — — — EDGE OF PAVEMENT --- EDGE OF CURB -xx -EXISTING CONTOUR

WATER GATE

ES DECIDUOUS TREE

CONIFEROUS TREE

SPRINKLER SHUT OFF

ELECTRIC MANHOLE

SAMPLE STATION (NOT SURVEYED)

O UTILITY POLE

CATCH BASIN

D DRAIN MANHOLE

MAGNETIC NAIL SET

CONC. = CONCRETE TBM = TEMPORARY BENCH MARK

AREA A - 0-2 FEET MIN RCRA C SOIL > 1000 mg/kg LEAD

AREA B - 0-2 FEET MIN RCRA D SOIL > 150 mg/kg LEAD

AREA C - 2-3 FEET MIN

RCRA D SOIL > 150 mg/kg LEAD

AREA D - 0-0.5 FEET MIN

RCRA D SOIL > 150 mg/kg LEAD AND VISIBLE PAINT CHIPS PRESENT

BRUSH CLEARING LIMIT

1. THE COPYING OF THIS PLAN IS PROHIBITED. ANY REPRODUCTION

EXCLUSIVE USE BY THIS CLIENT AND FOR A SINGLE USE.

1929, HELD VERTICAL CONTROL POINT USC & G DISC F 28.

UTILITIES MAY NOT BE SHOWN ON THIS PLAN.

WITHOUT THE WRITTEN PERMISSION OF THIS SURVEYOR SHALL CONSTITUTE

A COPYRIGHT INFRINGEMENT. THIS PLAN HAS BEEN PREPARED FOR THE

2. THIS SURVEY DOES NOT INTEND TO ASSURE THE USER OF THIS PLAN THE EXISTENCE OR NONEXISTENCE OF ANY UNDERGROUND UTILITIES OR APPURTENANCES ON THIS PROPERTY OR SITE. ANY DATA SHOWN HEREON HAS BEEN COMPILED FROM THE BEST AVAILABLE SOURCES. MORE EFFORT MAY BE NEEDED TO SHOW SUCH UTILITIES AND APPURTENANCES THAT MAY EXIST, WHICH IS BEYOND THE SCOPE OF THIS SURVEY. UTILITIES THAT WERE SCALED FROM OTHER PLANS SHALL BE DETERMINED BY OTHERS. ABOVE GROUND UTILITIES ARE LOCATED AS OBSERVED IN THE FIELD. ALL

3. HORIZONTAL DATUM BASED ON NAD 1983, HELD HORIZONTAL CONTROL POINTS NGS PO 002 NAD PO 003. VERTICAL DATUM BASED ON NGVD

4. SURVEY PROVIDED BY LOUIS FEDERICI ASSOCIATES, PROVIDENCE, RI;

APPENDIX A SITE SPECIFIC HEALTH AND SAFETY PLAN

HEALTH AND SAFETY PLAN FOR MELVILLE WATER TOWER EXCAVATION/TRANSPORTATION OF LEAD CONTAMINATED SOILS

NAVSTA NEWPORT NEWPORT, RHODE ISLAND

COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

Submitted to:
Naval Facilities Engineering Command Mid-Atlantic
9742 Maryland Avenue
Norfolk, Virginia 23511-3095

Submitted by:
Tetra Tech NUS, Inc.
234 Mall Boulevard, Suite 260
King of Prussia, Pennsylvania 19406-1433

CONTRACT NUMBER N62467-04-D-0055 CONTRACT TASK ORDER 405

JUNE 2007

PREPARED UNDER THE DIRECTION OF:

STEPHEN'S, PARKER, LSP

TETRA TECH NUS, INC.

WILMINGTON, MASSACHUSETTS

APPROVED FOR SUBMISSION BY:

MATTHEW SOLTIS, CIH, CSP

TETRA TECH NUS, INC.

PITTSBURGH, PENNSYLVANIA

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SECTION 1.0 INTRODUCTION AND OVERVIEW

1.0 INTRODUCTION SITE SPECIFIC HEALTH AND SAFETY PLAN

The objective of this Health and Safety Plan (HASP) is to provide safe work practices and procedures to Tetra Tech NUS (TtNUS) personnel while engaged in site remediation activities (see Section 1.1) at the Melville Water Tower site located in the Town of Portsmouth, Rhode Island.

Site Name:	Melville Water Tower
Site Address:	South of 1351 West Main Road, Portsmouth, Rhode Island
Client Name:	US Navy CLEAN Contract# N62472-03-D0057
Contract Task Order (CTO) No.:	CTO 0405; 112G00825

1.1 SCOPE OF WORK

- Mobilize/demobilize field personnel and equipment to/from Melville Water Tower located in Portsmouth, Rhode Island.
- Conduct a Geographical Survey Locate and establish excavation boundaries established by previous soil sampling activities conducted under CTO 0008 (August 2006).
- Provide oversight and direction in the excavation of contaminated soils and transportation to the identified landfill. In addition, monitoring of backfilling, compaction and site restoration will be conducted.
- Decontamination of heavy equipment.

NOTE: Confined Space Entry Operations will not be conducted as part of this scope.

This HASP must be accompanied by the Tetra Tech NUS, Inc. Health and Safety Guidance Manual (TtNUS HSGM). The Guidance Manual provides additional information in the areas of program support, standard operating procedures, and safe work practices.

1.2 SAFE WORK PACKETS

The activities described in this HASP have been segregated into operational/separate Safe Work Packets that comprise the remainder of this HASP. The elements of the Safe Work Packet contain:

- Task Description
- Activity Hazard Analysis and Selected Control Measures
- Hazard Monitoring Direction
- Decontamination Procedures
- Task Specific element including H&S Program requirements, PPE requirements, and any permits that may be required.

The elements of the Safe Work Packets will be presented to the field crew prior to conducting the activity. This presentation may be conducted all at once (Site Specific Training) or through individual tail gate sessions as the work is to be completed. All persons will complete the following sections of this HASP, regardless of tasks they will conduct.

- Mobilization/Demobilization Safe Work Packet (applicable sections as determined by the SSHO)
- Safe Work Packet describing the Tasks to be performed
- Emergency Action Plan

The FOL/SSHO is required to complete each of the prescribed pieces of documentation within each packet prior to the initiation of that activity. The first page of each packet (Activity Documentation Checklist) has been provided in a checklist format to aid the FOL/SSHO in ensuring that all appropriate and required information and documentation is collected, completed, and/or reviewed. The FOL/SSHO is encouraged to make as many copies of the applicable packets as they may deem to be necessary so they may be provided to various field personnel as references.

1.3 SITE DESCRIPTION

The Melville Water Tower was constructed as part of the Melville Fuel Depot water supply system in the 1940s. This supply system involved an 8-inch "high service filtered water line" which extended from the water tank to a series of hydrants and pump houses to service the fuel storage tanks and fueling piers located at the Melville PT station. The 8-inch water line provided a sanitary and potable water supply as well as an emergency fire fighting water supply for the permanent station structures. It also served as a standby water reserve for the fuel oil tank fire protection system in this area.

Figure 1-1 is an aerial photo of the Melville Water Tower area.

Figure 1-1 Melville Water Tower, Portsmouth, RI



1.4 SITE DETAILS

The Melville Water Tower is located approximately 25 miles south of Providence, Rhode Island on Aquidneck Island in the Town of Portsmouth, Rhode Island. Owned by the United States Navy, the site is located approximately 100 feet west of West Main Road and immediately south of the Melville Elementary School, located at 1351 West Main Road, Portsmouth Rhode Island.

The Melville Water Tower consists of a 50,000-gallon elevated tank on a steel tower with a high water elevation of 285 feet and bottom elevation of 165 feet. A 60-square foot locked chain-linked fence surrounds the steel structure. The school parking lot is located adjacent to the fence to the north while grass abuts the fence from all other directions. A wooded area is located approximately 30 feet south of the fenced area. A gravel surface, once the location of playground equipment, is situated 20 feet to the west of the fence.

1.5 CONTAMINANT HISTORY

The site contaminants in question (lead based paints with incidental levels of cadmium, chromium and arsenic) are a result of maintenance of the water tower (sandblasting the painted surfaces and repainting). The contaminant levels range from non-detects to 28,834 ppm of lead (sample location S45A taken at the northwest stanchion. Commercial structures such as this are primed with what is commonly referred to as "Red Lead" which is the initial layer described in previous RIDEM sample notes. Over the entire site contaminant levels in soils are below 2,000 ppm of lead. At this concentration exposure concerns through inhalation is considered negligible. There are however, areas where the concentrations reported are significantly higher based on sample results obtained during the August 2006 sampling effort. Table 1-1 and Figure 1-2 has been provided to illustrate contaminant concentrations and sample locations in and around the water tower.

Table 1-1 results were computed to determine what the source concentration in the soil would have to be to reach a benchmark concentration that would present an inhalation exposure concern to site personnel conducting these activities. This concentration is 2,000 mg/kg. Based on this number, a there are a number of grids points above this soil concentration. The Grids and concentrations presenting the greatest concern have been highlighted in Table 1-1.

Lead is the primary contaminant of concern based on reported concentrations. Overexposure to this substance can occur via ingestion (incidental hand to mouth contact) or through inhalation of airborne dust. Symptoms of overexposure may result in metallic taste in the mouth, dry throat, thirst, Gastrointestinal disorders (burning stomach pain, nausea, vomiting, possible diarrhea sometimes bloody or black, accompanied by severe bouts of colic). Chronic exposure, CNS effects (muscular weakness, pain, cramps, headaches, insomnia, depression, damage to the kidneys, gingival lead line, brain, and anemia. Acute exposures can result in partial paralysis possibly coma and even death.

Extremely high concentrations were reported in the initial RIDEM sample location S45 and S45A. These concentrations were 9850 and >28,000 ppm respectively. At concentrations of this magnitude it takes very little to become airborne to achieve overexposure via inhalation.

Subsequent sampling has indicated that the maximum concentration observed was 12,500 mg/kg in Grid B75 at 3 to 6-inches with a reported concentration of 12,300 0 to 3-inches.

The greatest number of samples greater than 2,000 mg/kg was in Grid F within the top 1-foot.

Remember: Inhalation is not the only route of exposure, ingestion is the primary concern achieved through incidental hand to mouth contact. Diligent use of PPE, good work hygiene practices, and no hand to mouth activities, and diligent decontamination procedures will control potential exposure and cross contamination.

1.6 KEY PERSONNEL ASSIGNMENTS

The following personnel exercise primary responsibility for the health and safety of Tetra Tech NUS, Inc. and subcontractor personnel on this project performing the activities addressed in this HASP.

NAME/POSITION	CONTACT INFORMATION
Mr. James Colter US Navy Remedial Project Manager	(757) 444-4217 (Office)
Ms. Cornelia Mueller NAVSTA Newport Facility Contact	(401) 841-7561
Mr. Richie Machado, NUWC Environmental Alternate Contact	(401) 832-5870
Stephen Parker Tetra Tech NUS, Inc. Project Manager (PM) and Field Operations Leader (FOL)	(978) 658-7899 Ext. 1239 Stephen.Parker@ttnus.com
TBD Tetra Tech NUS, Inc. Site Safety and Health Officer (SSHO)	
Thomas M. Dickson, CSP Project Health and Safety Officer (PHSO)	(412) 921-8457 <u>Tom,Dickson@ttnus.com</u>
Matthew Soltis CIH, CSP Tetra Tech NUS, Inc. Health and Safety Manager (HSM)	(412) 921-8912 <u>Matt.Soltis@ttnus.com</u>

Hazard	Assessments	(for	purposes	of 29	CFR	1910.132)	and	HASP	preparation	have	been	conducted
by:												
<u>Thomas</u>	s M. Dickson,	CSP										

TABLE 1-1
MELVILLE WATER TOWER AUGUST 2006 SOIL SAMPLING RESULTS

Grid						Analytical Results					
	cation	Sample Name	Dep	th in Ir	nches	Laboratory 1	Laboratory 2	RPD	Maximum Concentration	Units	
A	0	MWT-S-SOA0-0003	0	to	3	22	60	92%	60	MG/KG	
Α	25	MWT-S-SOA25-0003	0	to	3	12	27	78%	27	MG/KG	
A	50	MWT-S-SOA50-0003	0	to	3	130	246	62%	246	MG/KG	
A	75	MWT-S-SOA75-0003	0	to	3	730	3310	128%	3310	MG/KG	
Α	75	MWT-S-SOA75-0306	3	to	6	35	369	165%	369	MG/KG	
A	75	MWT-S-SOA75-0612	6	to	12	42	124	99%	124	MG/KG	
Α	100	MWT-S-SOA100-0003	0	to	3	410	697	52%	697	MG/KG	
Α	125	MWT-S-SOA125-0003	0	to	3	130	322	85%	322	MG/KG	
Α	150	MWT-S-SOA150-0003	0	to	3	130	219	51%	219	MG/KG	
В	0	MWT-S-SOB0-0003	0	to	3	170	345	68%	345	MG/KG	
В	25	MWT-S-SOB25-0003	0	to	3	190	91	70%	190	MG/KG	
В	25	MWT-S-SOB25-0306	3	to	6	30	86	96%	86	MG/KG	
В	25	MWT-S-SOB25-0612	6	to	12	10	70	150%	70	MG/KG	
В	25	MWT-S-SOB25-1224	12	to	24	21	21	1%	21	MG/KG	
В	50	MWT-S-SOB50-0003	0	to	3	610	1110	58%	1110	MG/KG	
В	75	MWT-S-SOB75-0003	0	to	3	1800	2180	19%	2180	MG/KG	
В	75	MWT-S-SOB75-0306	3	to	6	4200	12300	98%	12300	MG/KG	
		MWT-S-SOB75-0306-		.,,,,,							
В	75	D	3	to	6	8100	12500	43%	12500	MG/KG	
В	75	MWT-S-SOB75-0612	6	to	12	2200	7180	106%	7180	MG/KG	
В	75	MWT-S-SOB75-1224	12	to	24	730	458	46%	730	MG/KG	
В	100	MWT-S-SOB100-0003	0	to	3	740	1570	72%	1570	MG/KG	
В	125	MWT-S-SOB125-0003	0	to	3	87	182	71%	182	MG/KG	
В	125	MWT-S-SOB125-0306	3	to	6	170	313	59%	313	MG/KG	
В	125	MWT-S-SOB125-0612	6	to	12	210	379	57%	379	MG/KG	
В	125	MWT-S-SOB125-1224	12	to	24	400	65	144%	400	MG/KG	
В	150	MWT-S-SOB150-0003	0	to	3	47	73	43%	73	MG/KG	
С	0	MWT-S-SOC0-0003	0	to	3	10	72	153%	72	MG/KG	
С	25	MWT-S-SOC25-0003	0	to	3	390	559	36%	559	MG/KG	
С	25	MWT-S-SOC25-0003-	0	to	3	530	757	35%	757	MG/KG	

TABLE 1-1
MELVILLE WATER TOWER AUGUST 2006 SOIL SAMPLING RESULTS

Grid				*****		Analytical Results					
1	cation Sample Name		Depth in Inches		Laboratory 1	Laboratory 2	RPD	Maximum Concentration	Units		
		D									
С	50	MWT-S-SOC50-0003	0	to	3	820	682	18%	820	MG/KG	
С	75	MWT-S-SOC75-0003	0	to	3	890	2460	94%	2460	MG/KG	
С	75	MWT-S-SOC75-0306	3	to	6	600	1090	58%	1090	MG/KG	
С	75	MWT-S-SOC75-0612	6	to	12	530	873	49%	873	MG/KG	
С	75	MWT-S-SOC75-1224	12	to	24	20	34	51%	34	MG/KG	
С	100	MWT-S-SOC100-0003	0	to	3	480	317	41%	480	MG/KG	
С	125	MWT-S-SOC125-0003	0	to	3	32	100	103%	100	MG/KG	
С	150	MWT-S-SOC150-0003	0	to .	3	22	47	73%	47	MG/KG	
С	162	MWT-S-SOC162-0003	0	to	3	34	87	88%	87	MG/KG	
С	162	MWT-S-SOC162-0306	3	to	6	20	42	71%	42	MG/KG	
С	162	MWT-S-SOC162-0612	6	to	12	12	42	112%	42	MG/KG	
С	175	MWT-S-SOC175-0003	0	to	3	26	54	69%	54	MG/KG	
		MWT-S-SOC175-									
С	175	0003-D	0	to	3	18	63	111%	63	MG/KG	
D	0	MWT-S-SOD0-0003	0	to	3	29	77	91%	77	MG/KG	
D	25	MWT-S-SOD25-0003	0	to	3	110	136	21%	136	MG/KG	
D	25	MWT-S-SOD25-0306	3	to	6	19	52	93%	52	MG/KG	
D	25	MWT-S-SOD25-0612	6	to	12	16	48	100%	48	MG/KG	
D	25	MWT-S-SOD25-1224	12	to	24	14	26	59%	26	MG/KG	
D	50	MWT-S-SOD50-0003	0	to	3	42	82	65%	82	MG/KG	
D	75	MWT-S-SOD75-0003	0	to	3	120	209	54%	209	MG/KG	
		MWT-S-SOD75-0003-									
D	75	D	0	to	3	130	230	56%	230	MG/KG	
D	75	MWT-S-SOD75-0306	3	to	6	77	282	114%	282	MG/KG	
D	75	MWT-S-SOD75-0612	6	to	12	54	142	90%	142	MG/KG	
D	75	MWT-S-SOD75-1224	12	to	24	8	12	39%	12	MG/KG	
D	100	MWT-S-SOD100-0003	0	to	3	55	671	170%	671	MG/KG	
D	125	MWT-S-SOD125-0003	0	to	3	86	124	36%	124	MG/KG	
D	125	MWT-S-SOD125-0306	3	to	6	41	86	71%	86	MG/KG	

TABLE 1-1
MELVILLE WATER TOWER AUGUST 2006 SOIL SAMPLING RESULTS

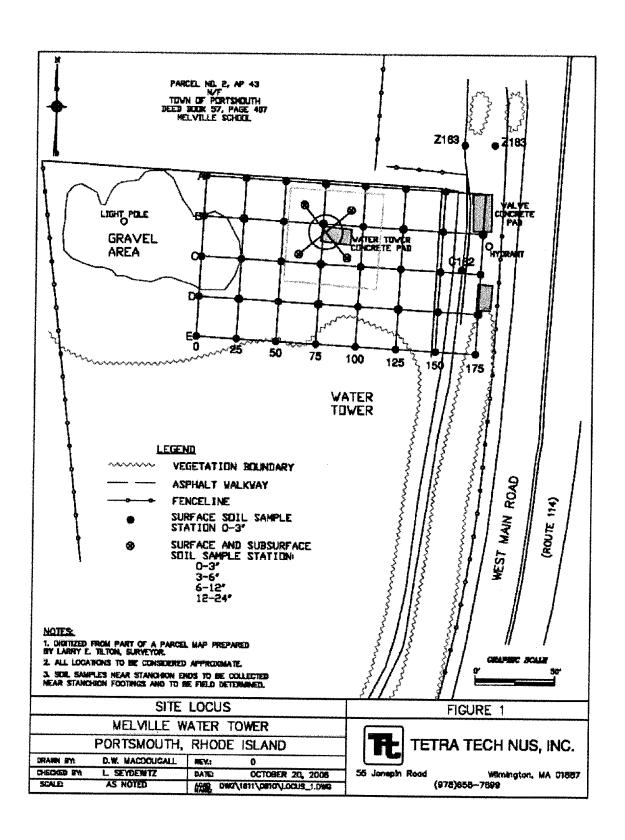
Grid					Analytical Results					
Loc	ation	Sample Name	Dep	Depth in Inches		Laboratory 1	Laboratory 2	RPD	Maximum Concentration	Units
D	125	MWT-S-SOD125-0612	6	to	12	20	73	114%	73	MG/KG
D	125	MWT-S-SOD125-1224	12	to	24	25	44	56%	44	MG/KG
D	150	MWT-S-SOD150-0003	0	to	3	36	60	50%	60	MG/KG
D	178	MWT-S-SOD178-0003	0	to	3	20	56	95%	56	MG/KG
D	178	MWT-S-SOD178-0306	3	to	6	34	36	6%	36	MG/KG
D	178	MWT-S-SOD178-0612	6	to	12	18	36	66%	36	MG/KG
E	0	MWT-S-SOE0-0003	0	to	3	32	48	41%	48	MG/KG
E	25	MWT-S-SOE25-0003	0	to	3	31	65	71%	65	MG/KG
E	50	MWT-S-SOE50-0003	0	to	3	240	494	69%	494	MG/KG
E	75	MWT-S-SOE75-0003	0	to	3	94	312	107%	312	MG/KG
E	100	MWT-S-SOE100-0003	0	to	3	200	321	46%	321	MG/KG
E	125	MWT-S-SOE125-0003	0	to	3	56	101	57%	101	MG/KG
E	150	MWT-S-SOE150-0003	0	to	3	27	67	86%	67	MG/KG
E	175	MWT-S-SOE175-0003	0	to	3	15	39	89%	39	MG/KG
		MWT-S-SOE175-								
E	175	0003-D	0	to	3	16	43	91%	43	MG/KG
F	1	MWT-S-SOF1-0003	0	to	3	2900	6670	79%	6670	MG/KG
F	1	MWT-S-SOF1-0003-D	0	to	3	4200	9120	74%	9120	MG/KG
F	1	MWT-S-SOF1-0306	3	to	6	1400	2680	63%	2680	MG/KG
F	1	MWT-S-SOF1-0306-D	3	to	6	1300	2480	62%	2480	MG/KG
F	1	MWT-S-SOF1-0612	6	to	12	670	2210	107%	2210	MG/KG
F	1	MWT-S-SOF1-1224	12	to	24	370	486	27%	486	MG/KG
F	2	MWT-S-SOF2-0003	0	to	3	3400	5810	52%	5810	MG/KG
F	2	MWT-S-SOF2-0306	3	to	6	1700	3150	60%	3150	MG/KG
F	2	MWT-S-SOF2-0612	6	to	12	1400	3780	92%	3780	MG/KG
F	3	MWT-S-SOF3-0003	0	to	3	2700	3170	16%	3170	MG/KG
F	3	MWT-S-SOF3-0306	3	to	6	1800	3310	59%	3310	MG/KG
F	3	MWT-S-SOF3-0306-D	3	to	6	1900	3280	53%	3280	MG/KG
F	3	MWT-S-SOF3-0612	6	to	12	460	1430	103%	1430	MG/KG
F	3	MWT-S-SOF3-1224	12	to	24	28	53	62%	53	MG/KG

TABLE 1-1

MELVILLE WATER TOWER AUGUST 2006 SOIL SAMPLING RESULTS

Grid Location		Sample Name	Depth in Inches			Analytical Results				
						Laboratory 1	Laboratory 2	RPD	Maximum Concentration	Units
F	4	MWT-S-SOF4-0003	0	to	3	1800	2600	36%	2600	MG/KG
F	4	MWT-S-SOF4-0306	3	to	6	830	2380	97%	2380	MG/KG
F	4	MWT-S-SOF4-0612	6	to	12	880	1470	50%	1470	MG/KG
F	4	MWT-S-SOF4-1224	12	to	24	1300	3450	91%	3450	MG/KG
F	4	MWT-S-SOF4-1224-D	12	to	24	2800	3830	31%	3830	MG/KG
Z	163	MWT-S-SOZ163-0003	0	to	3	21	69	106%	69	MG/KG
Z	183	MWT-S-SOZ183-0003	0	to	3	180	536	99%	536	MG/KG

The highlighted cells indicate locations greater than 2,000mg/kg. During excavation and loading activities it would be at these locations where a sufficient amount of source materials exist to support an inhalation exposure potential. Additional care and diligence will be exercised within these grids to insure the soils are adequately saturated to minimize mechanical airborne generation.



SECTION 2.0 MOBILIZATION/DEMOBILIZATION SAFE WORK PACKET

SECTION 2.0

2.1 ACTIVITY AND DOCUMENTATION CHECKLISTS

rne S	are work Packet for Mobilization/Demobilization Activity contains the following information:
	Table 2-1 Mobilization/Demobilization Activity Hazard Analysis
	Mobilization/Demobilization Safe Work Practices – These are general safe work practices that are to be reviewed with the Activity Hazard Analysis for this task during the site briefing).
	Figure 2-1, TtNUS Health and Safety Policy (To be posted in a conspicuous location where everyone will see it. These can be maintained in a folder/binder as long as everyone is aware where they can find it.)
	Figure 2-2, OSHA Poster (To be posted in a conspicuous location where everyone will see it. These can be maintained in a folder/binder as long as everyone is aware where they can find it.)
	Figure 2-3, Site Specific Training Documentation (Section 2.0, Attachment 2-2 of the HSGM). All personnel who attend will print and sign the training documentation form attesting to their personal the information provided.
	Figure 2-4, Tail Gate Meeting Attendance Form
	Figure 2-5, Medical Data Sheets (Section 3.0, Figure 3-6 of the Health and Safety Guidance Manual (HSGM) including HIPAA Privacy Act requirements.

d Remember:

- Collect Training and Medical Surveillance information from all personnel.
- Complete Medical Data Sheets for All personnel. Remember to review HIPAA Privacy Act requirements prior to completing the Medical Data Sheet.
- Collect Operator Qualification information (i.e. Operators Union Card indicating they are qualified to operate identified pieces of equipment; training certification; or company provided letter indicating operator qualification)
- Drive the route to the hospital to determine estimated travel time, primary and alternate routes, etc.

Table 2-1 Activity Hazard Analysis

ACTIVITY: Mobilization/Demobilization

ANALYZED BY/DATE: Tom Dickson 05/2007

ACTIVITY / PHASE	POTENTIAL HAZARDS	RECOMMENDED ACTIONS / CONTROLS
Receiving Chemicals on site	Exposure to Chemical Hazards	Chemical Hazards - To control hazards associated with chemical use the following measures will be incorporated
		 Field personnel will review the MSDS prior to using the chemical if they are unfamiliar with the hazards and/or recommended control measures. This document provides hazard information associated with the inherent hazards of the chemical. This HASP will provide hazard information as it pertains to the task or the chemicals use and application. Wear the designated PPE as prescribed in the MSDS, HASP or at the direction of the SSHO.
		 The onsite Hazard Communication Program (Section 5.0 TtNUS Health and Safety Guidance Manual) will be completed and maintained by the FOL and/or the SSHO Create and maintain an accurate Chemical Inventory List (Entries will match chemicals brought on-site, as the names appear on the MSDS and the label). MSDS's will be maintained in a central location, accessible to all personnel. All containers will have labels specifying the following information: a) Chemical Identity (As it appears on the label, MSDS, and Chemical Inventory List) b) Appropriate Warning (i.e., Eye and skin irritation, flammable, etc.) c) Manufacturer's Name Address and Phone Number
		When handling chemicals use the prescribed PPE listed in the MSDS(s) unless otherwise directed in this HASP or by the SSHO.
		The FOL and/or the SSHO shall insure any emergency provisions identified in the MSDS have been obtained and are available on-site.
 Procurement of equipment Preparation of Equipment Site Preparation a. Obtain utility clearances 	2) Lifting	 Lifting (strain/muscle pulls) Where possible, use machinery or multiple personnel for heavy lifts, use proper lifting techniques (i.e., plan each lift, do a test lift, inspect paths of travel, lift with legs, obtain good hand holds, move close to the center of gravity of the item to be lifted). Additional safe lifting practices may be found in Section 4.4 of the Health and Safety Guidance Manual (HSGM).

ACTIVITY / PHASE	POTENTIAL HAZARDS	RECOMMENDED ACTIONS / CONTROLS
b. Establish site traffic		d Remember:
patterns c. Construct decon pad and IDW storage		Your muscles are most vulnerable during the first 30-minutes of work (Stretch before you start), stretch before periods of extreme physical exertion. You become more vulnerable again later in the day when fatigue sets in. To combat potential injury, increase break frequencies as needed and get help where possible.
areas	3) Cuts/Lacerations	 3) Cuts/Lacerations Inspect all cutting equipment to be used for defects. When cutting items - always use a sharp knife and always cut away from your body. Do not place items to be cut in your opposite hand or on your knee. When hand-cutting wear cut resistant gloves or a glove at least on your non-knife hand.
	4) Slips/Trips/Falls	4) Slips, trips, and falls - Remove/identify/demarcate trip hazards within the work area. - Maintain good housekeeping within work areas. - Steel toed work shoes/boots should be equipped with an adequate lug to support traction over a number of terrain types.
	5) Traffic Hazards	 5) Vehicular and foot traffic - Traffic and equipment considerations are to include the following during set up: The FOL and/or the SSHO as a precautionary measure to remove/demarcate/ or otherwise mark physical hazards within the work area prior to the commitment of personnel and resources. Observe all posted traffic signs. Do not impede/encroach active roadways. DO NOT place trailer doors leading out into active traffic patterns. DO NOT place obstructions along the roadway that blocks line of sight. When site activities incur upon normal traffic patterns (within 15-feet) the following measures will be incorporated Wear High Visibility Vest. Utilize traffic signs and barricades where necessary (Within 5-feet of normal traffic patterns). Utilize flag persons, traffic signs and barricades when working within established traffic patterns to control traffic in and around the work activity. See Section 2.1 concerning additional site control measures.

Hazard Monitoring Required:

None –Visual observation of work practices by the FOL and/or the SSHO to minimize potential physical hazards (i.e., improper lifting, unsecured loads, cutting practices, etc.).

Decontamination Procedures:

Not required. Good personal hygiene practices should be employed prior to breaks lunch or other period when hand to mouth contact occurs. This will minimize potential ingestion exposures.

Permits/Requirements:

 None required for this activity.
 However, you should be finalizing your dig permit if you haven't already.
 This dig permit must be current!!!

PPE Requirements

Hazards associated with this activity are physical in nature such as lifting, site preparation, and construction of barricades around control zones. Each task shall be evaluated by the SSHO to determine the need for additional PPE. For example to minimize the potential effects of these hazards (i.e., hammering sample point hubs into the ground – flying projectiles – safety glasses will be selected, operation of power tools safety glasses and hearing protection will be employed), hard hats will be employed when for overhead hazards exist. Remember the general rule of thumb – Excessive noise levels are being approached if you must raise you voice to be heard by someone within two feet of your position. Selection of additional items will be based on site-specific conditions. Reflective vests for high traffic areas.

Caution should be exercised when working outdoors due to the harmful effects of the sun. Precautions should include wearing hat that shades the face neck and ears; liberal use of sunscreen; wrap around sunglasses; where possible.

The tasks for the day should be reviewed during the morning Tail Gate/Safety meeting (Figure 2-4) to incorporate this information.

Training Required

- 29 CFR 1910.120 (e) Site Specific Training (See Section 2.0 of the HSGM, Attachment 2-2).
- Safe Work Packet Review/Tail Gate Meeting Attendance

Medical Clearance/Surveillance Required

 Completed a Medical Data Sheet (Provide in this Safe Work Packet or See Section 3, Figure 3-6 of the HSGM for Blank forms)

Emergency Equipment

- First Aid Kit
- Fire Extinguisher
- Emergency Contact List and Map to Hospital Table 6-1. (In addition, place a copy in the First Aid Kit.)

The SSHO shall determine both, the number of first aid kits, fire extinguishers and associated emergency equipment and where they are placed.

H&S Supporting Program Requirements

- Hazard Communication Program(Section 5.0 HSGM)
 - Decontamination Solution Liquinox
 - Fuel Storage

2.2 SITE CONTROL

The following site control measures will be implemented during the mobilizations activities in support of the execution of this scope of work.

2.3 SANITATION AND BREAK AREAS

This section will address the following items:

- Toilets
- Potable water
- Showers and change rooms
- Break Areas

2.3.1 Toilets

One toilet will be provided for every 20 people. All toilets will be unisex and will have locking doors. The toilet provided will either be a chemical toilet and service provider or the flush toilet readily accessible at a predetermined approved location.

2.3.2 Potable Water

Potable water as well as electrolyte balance sports drinks such as Gatorade will be provided to the field crews for fluid replacement, as it is necessary under conditions of ambient temperature extremes. Storage and dispensing will proceed as follows:

- All containers will be clean and replenished daily.
- All containers will clearly marked as to their contents (Potable Water Drinking Water Only; Gatorade, etc.).
- Dispensing locations will be placed in identified break areas within the support zone. This will serve
 as an area for cooling (Shaded area) as well as an identified food and drink consumption area.
- If larger containers are used, dispensing cups will be provided.

 The coolers used for storage of potable drinks and cups will be stored in plastic bags away from potentially contaminating materials when not in use.

2.3.3 Showers and Change Rooms

Based on this scope and duration of this project shower facilities and locker rooms will not be required.

2.3.4 Break Areas

Given the location and the time of the year structured suitable locations for work breaks and warming/cooling regimens will be necessary. Shelters such as canopies should be provided for protection from the sun as well as to provide a suitable area to permit cooling in this hot environment.

MOBILIZATION/DEMOBILIZATION GENERAL SAFE WORK PRACTICES

In addition to the task-specific work practices identified, the following general safe work practices are to be observed when conducting work on-site. These practices establish a pattern of general precautions and measures for reducing risks associated with hazardous site operations.

- Do not eat, drink, chew gum or tobacco, take medication, and/or smoke in contaminated or potentially contaminated areas or where the possibility for the transfer of contamination exists (within any identified sample grid).
- Avoid contact with potentially contaminated substances. Do not walk through puddles, pools, mud, or other such areas. Avoid, whenever possible, kneeling on the ground or leaning or sitting on equipment.
- Attend briefings on anticipated hazards, equipment requirements, emergency procedures, and communication methods before going on site.
- Plan and delineate entrance, exit, and emergency escape routes.
- Rehearse unfamiliar operations, prior to implementation.
- Use the "buddy system". Buddies should maintain visual contact with each other and with other onsite team members by remaining in close proximity to assist each other in case of emergency.
- Immediately report all injuries, illnesses, and unsafe conditions, practices, and equipment to the Site Safety and Health Officer (SSHO).
- Matches and lighters are restricted from entering in the Exclusion Zone or Contamination Reduction Zone.
- Inform co-workers of potential symptoms of illness, such as headaches, dizziness, nausea, or blurred vision. These symptoms could be indicative of potential chemical exposure or possibly heat stress related conditions.



TETRA TECH NUS, INC. **HEALTH AND SAFETY POLICY**



Tetra Tech NUS, is committed to providing our employees with a safe and healthful workplace. We believe that occupational injuries and illness can be prevented; and we are convinced that a strong Health and Safety Program is essential to achieve this objective.

The principal elements of our program are founded on the requirements that our managers and employees:

- Recognize a personal responsibility for their own health and safety and for actions that affect the health and safety of fellow employees.
- Integrate safety and health into all aspects of their work, with the well-being of employees as the primary concern in all activities.
- Comply with applicable federal, state, and local regulations, as well as with the Tetra Tech Inc. and our clients' safety policies and procedures.
- Take an active role in the Health and Safety Program by providing input and constructive criticism for improvements to the program.

Mark Walsh President

Matthew M. Soltis, CIH, CSP Health and Safety Manager

Ron Chu

Chief Operating Officer

Tt

Tetra Tech NUS January 2007



Job Safety and Health It's the law!

EMPLOYEES:

- You have the right to notify your employer or OSHA about workplace hazards. You may ask OSHA to keep your name confidential.
- You have the right to request an OSHA inspection if you believe that there are unsafe and unhealthful conditions in your workplace. You or your representative may participate in that inspection.
- You can file a complaint with OSHA within 30 days of retaliation or discrimination by your employer for making safety and health complaints or for exercising your rights under the OSH Act.
- You have the right to see OSHA citations issued to your employer. Your employer must post the citations at or near the place of the alleged violations.
- Your employer must correct workplace hazards by the date indicated on the citation and must certify that these hazards have been reduced or eliminated.
- You have the right to copies of your medical records and records of your exposures to toxic and harmful substances or conditions.
- Your employer must post this notice in your workplace.
- You must comply with all occupational safety and health standards issued under the OSH Act that apply to your own actions and conduct on the job.

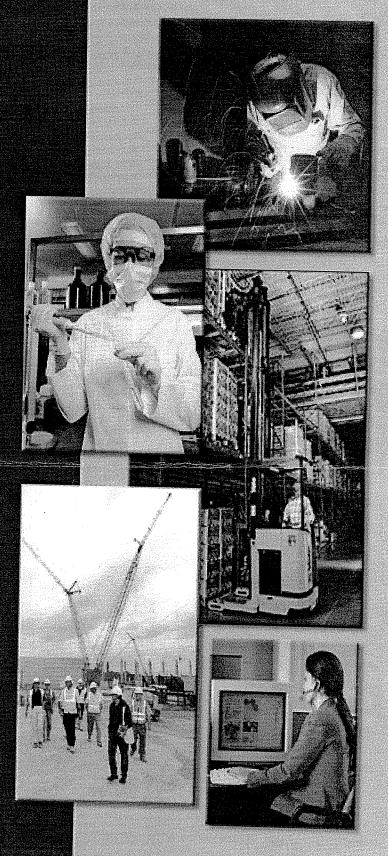
EMPLOYERS:

- You must furnish your employees a place of employment free from recognized hazards.
- You must comply with the occupational safety and health standards issued under the OSH Act.

This free poster available from OSHA – The Best Resource for Safety and Health

OSHA

Occupational Safety
and Health Administration
U.S. Department of Labor



Free assistance in identifying and correcting hazards or complying with standards is available to employers, without citation or penalty, through OSHA-supported consultation programs in each state.

1-800-321-OSHA

www.osha.gov

OSHA 2165-12-06R

2-2

FIGURE 2-3 SITE-SPECIFIC TRAINING DOCUMENTATION

This Attachment is to be completed anytime Site-Specific Training is conducted.

My signature below indicates that I am aware of the potential hazardous nature of performing remedial and/or investigatory activities at the Melville Water Tower Site located in Portsmouth, Rhode Island, and that I have received site-specific training which included the elements presented below:

- Names of designated personnel and alternates responsible for site safety and health
- · Safety, health, and other hazards present on site
- · Use of personal protective equipment
- · Safe use of engineering controls and equipment
- Safe work practices to minimize risks from hazards
- Medical surveillance requirements
- Signs and symptoms of overexposure
- Decontamination procedures
- · Contents of the Health and Safety Plan
- Emergency action procedures
- Review of the contents of relevant Material Safety Data Sheets
- Spill containment procedures

I further state that I have been given the opportunity to ask questions, that all of my questions have been answered to my satisfaction, and that I agree to abide by the procedures and policies as described to me.

I further state, by the presence of my signature below, that the dates of my training (introductory, refresher, and supervisory, as applicable) and my medical surveillance requirements are accurate and correct to the best of my knowledge.

Name (Printed and Signature)	Site- Specific Training (Date)	40-Hour Training (Date)	8-Hour Refresher Training (Date)	8-Hour Supervisory Training (Date)	Medical Exam (Date)

_Date:_____

FIGURE 2-4

Facility Name: _____

TAILGATE/SAFETY MEETING ATTENDANCE FORM

This form will be used to document Tail Gate and/or Safety Meetings. It is the responsibility of the FOL and/or the SSHO to complete this form if the applicable information is not recorded in the Field Logbook.

Project Number:				
Project/Task Order Manage				
Field Operations Supervisor	6			
Site Safety and Health Offic				
Type of Tasks Being Conducted Today:				
	Topics Discussed:			
ATTENDEE'S NAME	JOB TITLE	AFFILIATION	SIGNATURE	
		·		
Instructor(s):				
Action Items/Due Date/Responsi	bility:			
	78,444			

FIGURE 2-5 MEDICAL DATA SHEET

This attachment must be completed for each field crew member (Tetra Tech NUS, Inc. and subcontractor personnel) and approved visitors who wish to enter active operational zones. Information provided in this document should contain information you would want medical personnel to know concerning your medical profile in the event you would be incapacitated. This Medical Data Sheet must be kept in a central location during the execution of site operations. This data sheet will accompany any personnel when medical assistance is needed or if transport to hospital facilities is required.

Project:	Melville Water Tower A	\ddress:	1351 West Main Road
			Portsmouth, RI
Name:		Но	me Telephone:
Address:			
Age:	Height:		Weight:
Occupation	n:		
	ext of Kin:		
	ne#:Work Phone#:		
Drugs/Aller	gies/Sensitivities:		
Do You We	ear Contacts?		
What medi	cations are you presently using?		
Past Medic	al History/Review of Systems (Check if you have I	nad positiv	e history and would like this information
	to an attending physician in the event of an emerg		·
☐ Heart 0	Conditions (Chest pains, angina, heart attacks)		☐ Endocrine (Thyroid, diabetes)
☐ Gastro	intestinal Conditions (Ulcers, liver, GI Bleeding)		☐ Hematological (Clotting, anemia)
☐ Pulmor	nary (Difficulty in breathing, coughing, asthma, pne	umonia)	☐ Cancer
☐ Muscul	ar/Skeleton (Arthritis, Fractures, etc.)		☐ Neurological [Headaches,
☐ Kidney	/Urological Disorder (kidney stones, renal failure)		dizziness, strokes (CVA, TIA)]
Other (Comments:	Recent Illnesses, weight loss, fever, etc.) (Please explain positive indications)		
Do you hav	e any medical restrictions?		
mmunizatio	on History: Last Tetanus Shot or Booster (Date):	Pne	eumonia Vaccination (Date):
	tion (Date):		er:
Vame, Addı	ress, and Phone Number of personal physician: _		
	Signature		Date

Your signature above agrees that any information you provide will be maintained at the work site where it is easily accessible. Your signature also indicates that you understand that this information will not be secured due to the necessity for quick access.

2.4 MEDICAL DATA SHEET EXCEPTION - HEALTH INSURANCE PORTABILITY AND ACCOUNTABILITY (HIPAA) REQUIREMENTS - THE PRIVACY RULE

The Privacy Rule took effect April 14, 2003. Loosely interpreted, it establishes regulations for the use and disclosure of Protected Health Information (PHI) by the entity collecting that information (Us - Tetra Tech NUS, Inc.). PHI is any information about health status (such as that you may report on your Medical Data Sheet Information), provision of health care, or payment for health care. This rule also requires Tetra Tech NUS, Inc. in this case to ensure the confidentiality of that communication (Medical Data Sheets). This provision severely limits the ability of the Medical Data Sheet to convey information you would want the Doctor to know regarding PHI, if you were incapacitated. This rule also limits the SSO ability to ensure provisions are in place to provide timely response for instance to an allergic reaction. So before you complete the Medical Data Sheet understand that:

The Medical Data Sheets will not be maintained in a secure location. They will be maintained in a file box or binder accessible to all members of the field crew. This is intended to make these documents quickly accessible, so they can accompany the injured party to the hospital.

DO NOT include information that you do not wish others to know, only information that may be pertinent in an emergency situation or treatment.

If you are concerned about any of these provisions do not complete the medical data sheet, but convey verbally to the SSO any information about allergic reactions or drug allergies that would be critical in your treatment.

SECTION 3.0 GEOGRAPHICAL SURVEYING SAFE WORK PACKET

SECTION 3.0

3.1 ACTIVITY AND DOCUMENTATION CHECKLIST

The Safe Work Packet is for Geophysical/Geographical Surveying activities on the Melville Water Tower Site located in Portsmouth, RI.

Table 3-1 Geophysical/Geographical Surveying Activity Hazard Analysis
Site Maps (These are to be created as information is developed)

The Safe Work Packet for this activity contains the following information

Remember:

 All personnel must complete the Mobilization/Demobilization Safe Work Packet and review the Emergency Action Plan in addition to their Task Specific Safe Work Packet(s).

Table 3-1 Activity Hazard Analysis

ACTIVITY: Geophysical/Geographical Surveying

ANALYZED BY/DATE: Tom Dickson 05/2007

ACTIVITY / PHASE	POTENTIAL HAZARDS	RECOMMENDED ACTIONS / CONTROLS
Early on in the project, the grid for soil sampling was laid out by locating the corners of the grid using a hand held GPS. A string was then strung between each corner and sample points were placed every 25-feet. Once the exterior of the sample grid was located, the internal points were located on 25-foot intervals. Surveying activities were expanded in May 2007 to include Land	1) Flying projectiles/Struck by	 Flying projectiles/Struck by When hammering wooden hubs into the ground there is a possibility that shards may break off. To protect from potential eye injury during this activity personnel will wear safety glasses. Crack or damage hubs will not be used. Use a suitable hammer to drive the hubs. The hammer shouldn't be so heavy that and additional person must hold the hub while you drive it into the ground. Inspect the hammer to insure the head is attached tightly and there are no indication of mushrooming head that could also become a flying projectile should it break off.
surveying of control points within the site and surrounding area as well as establishing excavation boundaries for the removal of contaminated soils. The following activities will be conducted in support of this remedial	2) Slips/Trips/Falls	2) Slips, trips, and falls Remove/identify trip hazards from the work area. Maintain good housekeeping within the work area. Place the hubs in a bucket or similar device. That way should you fall you are less likely to impale yourself.
measure: - Benchmarks will be carried from the school property next door, or from locations from on the street/or nearest intersection. - Established existing features on the pavement around the site, not on the site, shall serve as new temporary benchmarks and linked to permanent points.	3) Poisonous Plants/Insect Bites	 3) Poisonous plants/Insect Bites – It is assumed that this area is well maintained (Grass is cut, etc.) and poisonous plants and insects will not be an issue. However, should this assumption be incorrect Poisonous Plants – Within the work area we may encounter Poison Ivy, Poison Oak, Poison Sumac, etc. An irritating, allergic reaction can occur after direct contact with the plant or indirect contact through some piece of equipment or clothing article. Oils are transferred from the plant to exposed skin, clothing, or piece of equipment. The degree of the irritation or allergic reaction can vary significantly from one person to the next. To control exposure to these plants
No digging on the site is allowed at this point.		 Know the plants. Avoid if at all possible. If not wear protective clothing that maybe thrown away when the task is complete. Wear barrier creams or PPE, prior to entry into heavy brush. Wash with cool water and soap or an over the counter solutions to remove these oils from the skin. Wash your contaminated clothes separate from your other clothes. Insects – Use repellants applied liberally to skin and clothing per the

ACTIVITY / PHASE

φ. 	buildings and along traffic thoroughfares. This may expose them to vehicular hazards.	 trailic. In this case, the concern is the size of the site and the ability to stage support functions a sufficient distance off West Main Street. Where possible: Avoid activities in the street during peak times. Motorists may be distracted by onsite activities – ASSUME THEY DO NOT SEE YOU OR MEMBERS OF YOUR FIELD CREW. DO NOT place obstructions along the sides of the road that may cause site personnel to move into the flow of traffic to avoid your activities or equipment. Provide a required Free Space of Travel. Your movement may startle a motorist and cause an accident. Required "Free Space": Maintain at least 6-feet of space between you and moving traffic. Where this is not possible, use flaggers and/or signs to warn oncoming traffic of activities near or within the travel lanes.
		 Face Traffic: Whenever feasible, if you must move within the 6-feet of required space, or into traffic attempt to face moving traffic at all times. Always leave yourself an escape route. Wear High Visibility Vests to increase visual recognition by motorist. Do not rely on the operator's visibility, judgment, or ability. Make eye contact with the driver. Carefully and deliberately use hand signals so they will not startle or confuse motorists or be mistaken for a flagger's direction before moving into traffic. Move Deliberately: Do not make sudden movements that might confuse a motorist. Avoid where possible interrupting Traffic Flow: Minimize crossing traffic lanes.

RECOMMENDED ACTIONS / CONTROLS

o Wear light colored clothing - This will assist in controlling heat stress as well as making crawling insects on your body easier to

Be extremely cautious around heavy, fast-moving equipment, vehicle

traffic. In this case, the concern is the size of the site and the ability to

Manufacturers requirements.

4) To minimize potential Vehicle Traffic Hazards

detect

POTENTIAL HAZARDS

4) Vehicle Traffic hazards -

Surveyors will be carrying

benchmarks from nearby

Hazard	Monitoring	Required:
--------	------------	-----------

None –Visual observation of work practices by the FOL and/or the SSHO to minimize potential physical hazards (i.e., improper lifting, unsecured loads, cutting practices, etc.).

Inclement Weather – Use the 30/30 Rule – If there is 30 seconds or less between thunder and lightning go inside for 30 minutes or more from the last thunder.

Decontamination Procedures:

Not required. Good personal hygiene practices are to be employed prior to breaks lunch or other period when hand to mouth contact occurs. This will minimize potential ingestion exposures.

Permits/Requirements:

 Surveyors should provide a copy of their Rhode Island License.

PPE Requirements (Italicized items are as conditions dictate or at the SSHO's discretion)

Level D – Standard Field Attire (Sleeved shirts, Long pants), Steel toed work shoes/boots, *hard hat, safety glasses, hearing protection* Surveying activity onsite and near highways (within 15-feet) and traffic pathways shall wear high visibility vests to increase visual recognition.

Training Required

- 29 CFR 1910.120 (e) Site Specific Training (See Section 2.0 of this HASP; Section 2.0 of the HSGM, Attachment 2-2).
- Tail Gate Meeting Attendance for this activity Figure 2-4.

Medical Clearance/Surveillance Required

Completed a Medical Data Sheet (See Mobilization/Demobilization Safe Work Packet or Section 3, Figure 3-6 of the HSGM for Blank forms)

The above training and medical clearance requirements are based on the fact that the surveyors will not be on-site during excavation or loading activities, when they could potentially be exposed to site contaminants. Should this be incorrect, then the training and medical surveillance requirements stipulated in Section 4.0 will apply.

Emergency Equipment

- First Aid KitFire Extinguisher
- Emergency Contact List and Map to Hospital (Table 6-1, plus one copy placed in the First Aid Kit).

H&S Supporting Program Requirements

None required.

SECTION 4.0 SOIL EXCAVATION/TRANSPORTATION AND OVERSIGHT SERVICES SAFE WORK PACKET

SECTION 4.0

4.1 ACTIVITY AND DOCUMENTATION CHECKLISTS

	afe Work Packet for the soil excavation/transportation and oversight activity to take place at the e Water Tower located in Portsmouth, RI. This safe work packet contains the following information:
	Table 4-1, Soil Excavation/Transportation/Oversight Activity Hazard Analysis
	Figure 4-1 through Figure 4-5 illustrating contaminant levels in and around the water tower
	Section 4.2, Excavation Safe Work Practices – These are general safe work practices that are to be reviewed with the Activity Hazard Analysis for this task during the site briefing).
	Figure 4-6, Heavy Equipment Inspection Checklist
	Figure 4-7, Load Inspection Checklist
	Figure 4-8, Air Monitoring Log
П	Table 4-2. Decontamination Activity Hazard Analysis

ACTIVITY / PHASE	POTENTIAL HAZARDS	RECOMMENDED ACTIONS/CONTROLS
Soil excavation/transportation services will be provided by a Tetra Tech NUS, Inc. Subcontractor contractor who will be working under their own health and safety plan. It should be noted that where provisions identified in this Safe Work Packet are not identified or documented in the Contractors HASP or are more conservative, the provisions of this Safe Work	1) Heavy Equipment Hazards including Struck by/caught between Equipment malfunction/ Operator error	1) Heavy Equipment Hazards – The selected subcontractor will provide assurance that the excavator or similar devices or equipment being used to excavate contaminated soils and/or for removal/demolition of foundation structures is in a safe operating condition. This may be accomplished by using their own Equipment Inspection Checklist or similar checklist/vendor certification to attest to the operating conditions. We have included a Heavy Equipment Checklist within this Safe Work Packet. It is intended that this checklist will provide technical assistance to the Tetra Tech NUS, Inc. person as to the information content associated with this process. The selected contractor will:
Packet will be applied.		Ensure the Excavator/earthmoving equipment is inspected prior to its initial use. The provided in the control of the con
Tetra Tech NUS employees oversight activities will include the following: Observation of site activities		 The equipment will be operated and supported by trained experienced operators and knowledgeable ground crew. If during the excavation and loading activity, if there is concern regarding the operating capabilities of the operator, bring it up to the subcontractor representative. If it is not satisfactorily resolved contact the PHSO.
including: - Movement and spotting of heavy equipment (excavator loaders, dump trucks) involved in soil loading and offsite transport. - Monitoring excavation/loading		In the Construction Industry in 2003, 56 fatalities were reported. The cause of these fatalities - being crushed between or run over by trucks and/or heavy equipment. This potential given the size of this site and room available to maneuver is greatly increased. The operators in these fatality cases, bears only some of the responsibility. To ensure this doesn't happen the selected subcontractor will
activities. This includes o Monitoring depth and location of excavation.		Provide a staging area, to permit only limited number of trucks within the loading area.
 Monitoring truck loading to insure over loading does not occur. 		Provide a designated Ground Spotter to guide and direct the movement of trucks and heavy equipment within this area.
Administrative functions (counting and documenting loaded trucks, manifests,		Provide Site control boundaries to keep unnecessary personnel from the area.
Load inspections, etc.)		Ensure back up/movement alarms are working on all heavy transport trucks and heavy equipment. In the case of site/personal vehicles on site personnel will be directed to use their horn, prior to backing up to alert persons within the area to pay attention to the

ACTIVITY / PHASE	POTENTIAL HAZARDS	RECOMMENDED ACTIONS/CONTROLS
		moving vehicle.
		Provide communication to the ground spotter and other ground personnel a means to alert all persons within the area. This may include two-way radios, or air horns that may be sounded in an emergency.
,		Operators, must NOT back up unless they are sure that it is clear.
		NEVER swing the bucket and/or boom over ground personnel (LOADED or NOT).
		Truck drivers are not permitted out of the truck and onto the bed during loading. If drivers get out, they must move to a designated staging area until loading is complete. At this time they may check the bed to determine, if the load is sufficiently placed to insure the load is balanced. The driver may request additional buckets to balance the load (not to exceed 3).
		Ground Spotters – Must never be placed between equipment or equipment and trucks or other immovable objects. ALWAYS allow an escape route.
		Oversight personnel:
		Never place yourself between equipment or equipment and trucks or other immovable objects. ALWAYS allow an escape route.
		Never assume the Operator sees you. Refrain from traveling within the Operator's blindspot.
		ALWAYS wear High Visibility Vest and Hard Hat to increase visual recognition. All personnel working on the ground should carry an air horn should you need to alert an operator of a potentially hazardous condition (such as running you over!). The air horn can be heard within an enclosed cab.
		DO NOT stand along side of a dump truck off loading clean fill. There exists the potential during off loading for the backfill to stick. If this happens, and the truck is out of level even the slightest bit may

ACTIVITY / PHASE	POTENTIAL HAZARDS	RECOMMENDED ACTIONS/CONTROLS
	2) Excavation hazards - • Excavation collapse • Falling into the excavation	 cause the truck to tip over sideways (possibly - Falling on you!). Place yourself a sufficient distance from the operation upwind where you may monitor operations but remain outside of the physical and chemical hazard boundaries. 2) Excavation hazards – Removal of contaminated soil over the site will vary however, it is however, not expected to exceed 2-feet for the removal of contaminated soils. Some areas maybe only inches deep.
		However, during foundation demolition and removal the potential exists for the excavation to go much deeper. Oversight and subcontractor personnel: WILL NOT enter any excavation in excess of 4-feet in total depth. Carry a tape measure, Know the limitations!
		 The Subcontractor – While the standards regarding excavation safety (29 CFR 1926.650652) may not apply given the depth and configuration of the excavation, these are good work practices including Refraining from piling stock piles and contaminated soils closer than 2-feet from the edge. Establish entry and exits points to control pedestrian traffic who may enter the shallow excavations. Utilize physical barriers or a Ground Spotter to insure trucks providing backfill do not back into the excavation and potentially tip over.
	 3) Energized systems - The primary emphasis associated with this hazard is the potential for striking an underground utility (Gas, electric, water, etc.). Struck by/collapse 	 3) Energized Systems – The Subcontractor shall insure that all utilities within the area to be excavated are located and marked prior to excavation. An excavation/dig ticket will be secured. Rhode Island Dig Safe System (888-242-1776 or 811) 48-hours in advance of any on-site excavation work to locate and mark identified membership utilities within the area.
	In addition, the potential for	 Utilities identified onsite will be tracked to their closest control point prior to excavation should there be accidental damage.

ACTIVITY / PHASE	POTENTIAL HAZARDS	RECOMMENDED ACTIONS/CONTROLS
	potential and kinetic energy sources also exist during maintenance activities on the heavy equipment.	As the materials to be excavated existed on government property, knowledge of supporting utilities may not exist. If this is the case, the subcontractor will
		 For each six inches to a foot of material removed, a Ground Support Person will enter the excavation to perform excavation sweeps using a magnetometer, soil probing, and/or hand digging to expose any subsurface utilities within the next 6-inch cut. This entry activity will occur to a depth not exceeding 4-feet. Where possible (based on soil composition), the excavator will be equipped with a Sand bar/flat bar cutting edge to avoid snagging undetected underground utilities. If utilities are marked within the excavation limit, the subcontractor is required to pothole (by hand) to locate these utilities, prior to the commencement of mechanized digging. See Section 7.0 of the HSGM for additional passive detection methods and safe work procedures in utility clearing and excavation.
		 Overhead power lines also create an onsite hazard – Look at the travel pattern, loading and unloading patterns. If this activity, raising the bed brings the bed closer than 10-feet to an overhead power lines report it to the Subcontractors Safety Coordinator. Remember, this 10-feet shall incorporate the radius of a potential tip over distance from the power source. Again, when selecting an observation point, Do NOT select one within a projected fall pattern as accidents do happen.
		Struck by/collapse - Care must also be exercised when working near power poles and support cables that sufficient amount of earth is left to support these structures. Guide cables within the swing pattern of the excavator will be marked using survey tape. The operator will be notified of their location. Personnel will remove themselves from a projected fall radius when working in this area.
		The following bulleted items represent various energy sources that may be encountered during heavy equipment maintenance activities on trucks and heavy equipment Chemical energy (corrosives, flammables, petroleum oils and lubricants).

ACTIVITY / PHASE	POTENTIAL HAZARDS	RECOMMENDED ACTIONS/CONTROLS
		 Electrical energy. Gravitational energy (movement caused by weight or position). Hydraulic energy (generated by liquids under pressure). Mechanical energy (spring-driven equipment, clutches, cams). Pneumatic energy (generated by pressurized gas or air). Thermal energy (extreme heat or cold).
		 To avoid hazards of this nature during maintenance activities, the following safety measures shall be employed Mechanics will be fully qualified regarding the mechanical and operational aspects of the machines they are servicing. In situations where complete control of the equipment cannot be secured and maintained by the mechanic or when multiple energy sources may be encountered, the service provider will employ Lockout/Tagout Program meeting the requirements of 1910.147 as it pertains to that activity including Identification of energy sources while conducting maintenance. Procedures for the application of energy isolating devices. Energy control isolation points to be used to control the identified energies.
		 Manufacturer provided energy control mechanisms such as pins and hydraulic arm supports will be employed to control gravitational energies.
		The SSHO will review all planned maintenance activities to be conducted on the site to determine the applicability of 1910.147.
	4) Chemical exposures The primary contaminant in this	4) Chemical Exposures
	case is lead associated with the sandblasting and painting operations conducted in the past. Lead is the primary contaminant of concern (COC).	Mathematical calculations were conducted to determine what the source concentration would have to reach before potentially causing an airborne inhalation hazard. Concentrations in the soils exceeding 2,000 mg/kg could present an occupational inhalation exposure potential. As a general work practice the subcontractor should \$\frac{1}{2}\$
	Table 1-2 and Section 1.4 of this HASP discusses	Engineering Controls
	contaminant concentration, location, and signs and	 Pre-saturate soils to be excavated. Employ area wetting during excavation to control dust generation

ACTIVITY / PHASE	POTENTIAL HAZARDS	RECOMMENDED ACTIONS/CONTROLS
	symptoms of overexposure. The information contained there provides the most recent sample results and the locations where those results were obtained. Grid F is the most contaminated.	 Administrative Controls Position your self where possible upwind. Monitor wind speeds to determine if and when work cessation needs to take place. Set up a directional wind sock at the highest point on the site to permit all personnel to know which way the wind is blowing. Adjust site control boundaries based on wind speed and approximate particle deposition. Signs placed indicating the following Warning – Lead Work Area Poison – No Smoking or Eating PPE Wear safety glasses, hard hat, high visibility vest and over boots when walking through contaminated soils. If your duties, result in a lot of surface contact (you get dirty) wear coveralls over top or instead street clothes. Vacuum off at the end of the day. Bag, do not mix with other laundry. Respiratory Protection based on achieving action levels through air sampling and monitoring results. Decontamination See Below. Air monitoring/sampling The subcontractor will provide air monitoring/sampling to provide qualitative and quantitative assessments of airborne lead. Examples of the air monitoring will provide the following minimum information. The first method approach is the NIOSH Method 7700. This method employs a spot test conducted on an air collection filter. If the spot check turns color, then you know you have detectable lead on the filter media. This permits real time determination. Color change will be yellow/orange to pink/red. This method will detect as little as 2 μg of lead. Action levels

ACTIVITY / PHASE	POTENTIAL HAZARDS	RECOMMENDED ACTIONS/CONTROLS
ACTIVITY / PHASE	POTENTIAL HAZARDS	will be 30 μg/m3 The second method, an aerosol monitor will be employed to measure total particulate airborne burden. For all grids with the exception of F, the action level will be • >2.5mg/m³ will require the employment of NIOSH Method 7700. • If the results of 7700 are positive, then air sampling will be conducted using NIOSH Method 7300. This information is to be recorded for either positive or negative determination of exposure. The third method employs NIOSH Method 7300 that employs the same pump and media as the 7700 however, the sample duration and flow rate are extended. The sample is then sent to the lab for analysis. Application/Frequency • Provide for personnel and perimeter air monitoring (aerosol monitor) and air sampling. The recommended methods are NIOSH Method 7700 and 7300. These are attached to this Safe Work Packet • High Risk personnel – Ground Spotter and Operator will be sampled to to provide and exposure assessment of these individuals regardless of achieving action levels. • Downwind sampling should be conducted at the perimeter fence; and at a pre-determined location (i.e. 100-feet from the fence). Additional distances will be determined through particle fallout estimations or sensitive receptors (downwind) such as the school near the air intake for the heating and cooling system. • At least two air samples will be collected during the excavation of Grid F, the grid with the highest contaminant concentration within the soils. It is also recommended where possible this grid will be excavated first to ascertain qualitatively and quantitatively the presence of lead to establish worst case scenario. The two air
		samples will include the job classification of the o Ground Spotter o Operator Addition measures to be employed include

ACTIVITY / PHASE	POTENTIAL HAZARDS	RECOMMENDED ACTIONS/CONTROLS
		 The operators in both the truck and excavator will remain in the respective cabs with the doors, windows, and vents closed. Air filter in to the excavator cab will be changed out frequently. The cab will be kept clean including floors will be washed out as necessary. Windows will also be kept clean to support vision. Soils to be excavated shall be pre-saturated to control airborne dusts. Where necessary, additional watering will be employed to control visible dusts. Personal decontamination and a boot wash (overboots for accessing the excavator through contaminated soils) will be established at the boundary of each operation area entrance and exit from the contaminated grids. Respiratory protection will be employed as action levels are achieved or based on voluntary requests. The Contractor Safety Coordinator will serve as the Competent Person regarding implementation of their respiratory program and as it pertains to lead compliance. During fueling, the excavator will be walked off of the pile or out of the excavation area to the exclusion zone boundary to permit the fueler contractor to access the machine without traveling through contaminated soils without overboots. This operator and ground support person are selected to have pre/post blood lead levels performed at their selected Health Care provider. This will establish a baseline and determine if exposure occurred during this activity. In addition, the subcontractor will insure provisions are in place to accomplish Erosion and sediment control Storm water management Evaluation of decontaminated personnel and equipment. Diligent use of selected personal protective equipment. These measures will be employed to control potential contaminant surface migration from the site. Oversight personnel: Position yourself upwind to monitor operations.

ACTIVITY / PHASE	POTENTIAL HAZARDS	RECOMMENDED ACTIONS/CONTROLS
		Obtain copies of the monitoring/sampling plan, results, air monitorin logs and calibration logs from the subcontractor as well as any audits they may have conducted. Send these to the PHSO for review.
		The reported source concentration limit of 2,000 mg/kg is hypothetical. Pre-saturation, area wetting can have a profound affect (up to 90% effective in controlling the mechanical generation of airborne dusts) on dust generation and control.
•	5) Vehicle Traffic and Foot Traffic-	5) Vehicular and foot traffic - Struck by a moving vehicle
	Within the heavy equipment hazards the potential hazards working in and around these pieces of equipment such as struck by and caught between have been discussed. However, as the site is relatively small much of the support measures will occur outside the fence along a residential roadway incurring hazards of general public traffic. In addition, the part of the oversight function is to ensure trucks leaving the site are not overloading both violating RI Dept. of Transportation standards and codes as well as putting other motorists at risk.	 Be extremely cautious around fast-moving vehicles. Where possible: Construct pedestrian traffic routes to within a free space of travel avoid being struck leaving the trailer or other onsite support are During initial placement, place the trailer door leading into the snot into the flow of traffic. Required "Free Space": Maintain at le 6-feet of space between you and moving traffic. Where this is possible, use flaggers and/or signs to warn oncoming traffic activities near or within the travel lanes. Motorist may be distracted by activities onsite, and accidentally you or members of your field crew. ALWAYS CONSIDER TH. THE DRIVER DOES NOT SEE YOU. DO NOT place obstructions along the sides of the road that me cause members of your field team to move into the flow of traffic avoid your activities or equipment. These items will also block field personnel and motorists line of site. Your movement may startled motorist and cause an accident. Provide a required Free Space Travel. Face Traffic: Whenever feasible, if you must move within the 6-fe of required space, or into traffic attempt to face moving traffic at times. Always leave yourself an escape route. Where High Visibility Vests to increase visual recognition
		 motorist. Do not rely on the operator's visibility, judgment, or ability. Make e contact with the driver. Carefully and deliberately use hand signal so they will not startle or confuse motorists or be mistaken for flagger's direction before moving into traffic.
		Move Deliberately: Do not make sudden movements that might

ACTIVITY / PHASE	POTENTIAL HAZARDS	RECOMMENDED ACTIONS/CONTROLS
		confuse a motorist. • Avoid, where possible, interrupting Traffic Flow: Minimize crossing traffic lanes.
		Overloading transport vehicles
		To control this hazard and the potential consequences, the following measures will take place:
		Where possible use portable scales or a truck with on board scales to determine the amount of weight/number of buckets loaded.
		 Overloading – While it is the Subcontractor's responsibility to monitor the amount of soils loaded in to each truck, oversight responsibility shall also be recognized. On an average earth weighs approximately 2430 lbs/yd³ with dense earth weighing as much as 3350 lbs/yd³. Legal limit is 22 tons. Therefore, if using a 1 yd³ bucket each truck can be loaded with approximately 15 full buckets before reaching the maximum allowable weight. It should be further noted that as water is applied to control dust emissions, the soils may be heavier than anticipated. Load Inspection Report – The subcontractor person shall employ the Load Inspection Report to ensure both driver qualifications and the load has been examined and approved to leave the site. An example is provided in this Safe Work Packet as Figure 4-7.
Transportation and disposal oversight activities (continued)	6) Noise It has been determine through previous monitoring that noise levels working within the immediate vicinity of operating equipment is greater than 85dB.	6) Noise - Remember the general rule of thumb If noise levels are such that you have to raise you voice to be heard by someone within two feet of you (subjective determination >85dB), wear hearing protection (plugs or muffs) with an NRR of at least 25 dB. Because this is a residential area operating hours will be restricted as dictated by local ordnances. If none are established 0700-1700 will be adhered to.
	7) Inclement weather	7) Inclement Weather – To minimize hazards of this nature, the following provisions shall be employed: - Electrical storms/high winds - Suspend or terminate operations in

ACTIVITY / PHASE	POTENTIAL HAZARDS	RECOMMENDED ACTIONS/CONTROLS
		the event of electrical storms and high winds. Follow the 30/30 rule - If there is 30 seconds or less between thunder and lightning, go inside a suitable structure (plumbing and wiring or vehicles) and remain there until at least 30 minutes after the last noted thunder.

Chemical Hazards:

Lead paint chips and dust have been created through surface maintenance of the water tower. Lead contaminants have bioaccumulative properties. Meaning concentrations of contaminants can accumulate in your body and you could reach an overexposure through successive smaller exposures without opportunity to detoxify. Based on an evaluation of available data, there is also concern for dermal and ingestion as well as inhalation. Good work hygiene practices and diligent use of PPE are discussed further in the text as being the primary controls to protect these dermal and ingestion routes of exposure.

According to the National Safety Council - In **adults (our workforce)**, overexposure to lead can increase blood pressure and cause fertility problems, nerve disorders, muscle and joint pain, irritability, and memory or concentration problems. It takes a significantly greater level of exposure to lead for adults than it does for children to sustain adverse health effects. Most adults who are lead poisoned get exposed to lead at work. Occupations related to firing ranges, house painting, welding, renovation and remodeling activities, smelters, the manufacture and disposal of car batteries, and the maintenance and repair of bridges and water towers (Hey that's us), are particularly at risk for lead exposure. Workers in these occupations must also take care not to leave their work site with potentially contaminated clothing, tools, and facial hair, or with unwashed hands. Otherwise, they can spread the lead to their family vehicles and ultimately to other family members such as young children where the affect may be much greater.

Women – If there are women on the job of child bearing years it is important that this precaution be discussed with them, if they are or intend to become pregnant in the near future. When a **pregnant woman** has an elevated blood lead level, that contaminant can easily be transferred to the fetus, through the placenta. In fact, pregnancy itself can cause lead to be released from the bone, where lead can be stored—often for decades—after it first enters the blood stream. (The same process can occur with the onset of menopause.) Once the lead is released from the mother's bones, it re-enters the blood stream and can end up in the fetus. In other words, if a woman had been exposed to enough lead so that for some of the lead has been stored in her bones, the mere fact of pregnancy can trigger the release of that lead and can cause the fetus to be exposed. In such cases, the baby can be born with an elevated blood lead level.

It should also be recognized that in men and women significant weight loss may also cause the release of lead form the bones.

Children – I am sure you are saying, why is he talking about children, there will be no children on the job. The reason for the discussion of children is that it is crucial to understand the critical need to perform a diligent decontamination of work clothes, shoes, hair, etc. to insure you do not carry these contaminants home whereby members of your household could be affected even from very small amounts. Exposure to lead is estimated by measuring levels of lead in the blood (in micrograms of lead per deciliter of blood). The U.S. Centers for Disease Control and Prevention (CDC) has set a "level of concern" for children at 10 micrograms per deciliter. At this level, it is generally accepted that adverse health effects can begin to set in. However, recent research published in the New England Journal of Medicine provides new evidence that there could well be very harmful effects occurring at even lower levels of exposure, even as low as 5 micrograms of lead per deciliter of blood. Within the adult population, (our workforce) the 40 micrograms per deciliter is the concentration when a person must be removed from their job due to lead exposure.

		EC												

ACTIVITY / PHASE POTENTIAL HAZARDS

OSHA standard establishes action levels for airborne concentrations of lead for which upon achieving these levels, respiratory protection must be worn. $30\mu g/m^3$ is the established action level when personnel must be included in respiratory protection program, medical surveillance and where exposure may be greater than 30 days/year a Lead Compliance program. $50\mu g/m^3$ of lead in the air is the Permissible exposure limit is based on an 8-Hour workday. If a 10-hour work day is worked then the number will be $40\mu g/m^3$. If the workday is 12-hours or longer then the number will need to be further reduced.

Spill Containment - Within this scope of work there are two areas/activities identified as vulnerable to potential spills. This includes

- Handling the drums/containers of waste materials
- Heavy Equipment Hydraulic operating system.
- Fuel Storage/Dispensing

This section describes the procedures the Tetra Tech NUS field personnel will employ upon the detection of a spill or leak.

First measure will be prevention

- Check all connections and hoses, initially then periodically. Where structural imperfections exist, replace as necessary.
- Keep oil absorbing pads, oil dry, and/or cat litter in the immediate vicinity of operating equipment in order to respond quickly.
- Notify the SSHO and/or FOL immediately upon detection of a leak or spill. Initiate incidental response measures, Spread pads and oil dry.
 Minimum on site PPE is sufficient for this task. Spread the absorbent material in the area of the spill, covering it completely.
- Collect and containerize the absorbent material. Label the new container appropriately. Await analyses for treatment and disposal options.
- Re-containerize spills, including 2-inch of top cover (if over soils) impacted by the spill. Await test results for treatment or disposal options.

Flammable/POL Storage

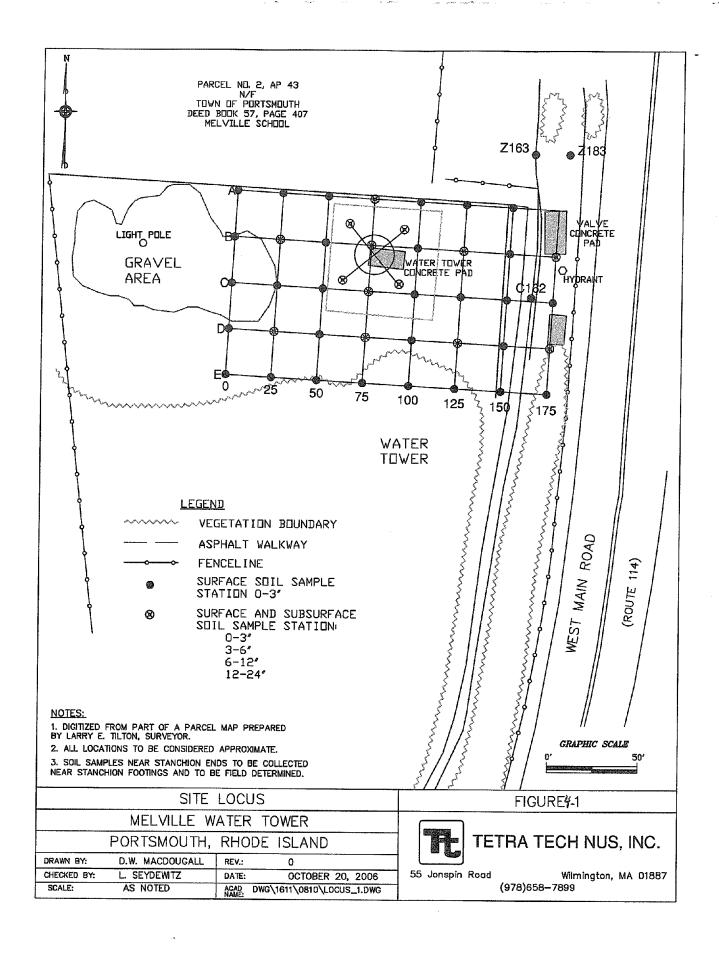
Flammable Storage [i.e., fuels, decontamination solvents (Isopropanol)] and Petroleum/oil/lubricants (POL) will require proper dispensing containers and necessary storage for cumulative volumes in excess of 25 gallons. Storage and dispensing will comply with the following requirements:

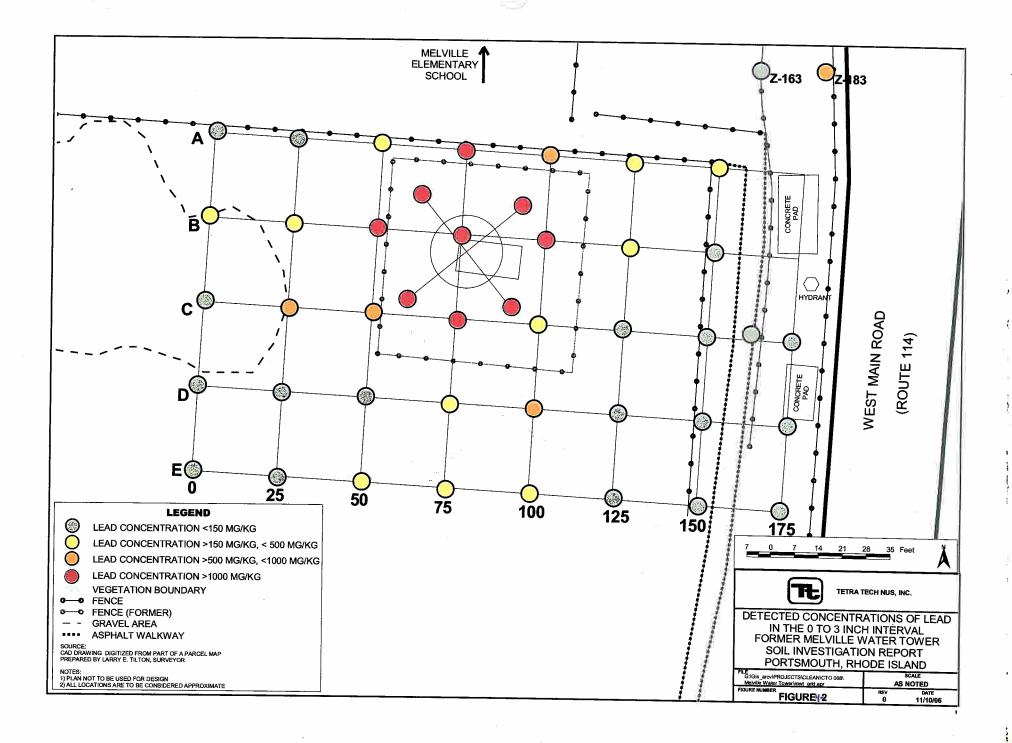
- The fuels, which will be stored and dispensed from portable containers, will utilize safety cans.
- Portable hand held storage containers will be labeled per Hazard Communication requirements.
- Larger volumes stored for fueling equipment will be stored in approved mobile Above Ground Storage Tanks with secondary containment capable of holding the tank volume plus 10%.
- Portable flammable liquid storage tanks will be properly grounded and will have bonding capabilities for the transfer of loading and off-loading of its contents.
- Dispensing locations will be supported by a Fire Extinguisher positioned no closer than 50 feet from the storage tank, properly mounted and identified.

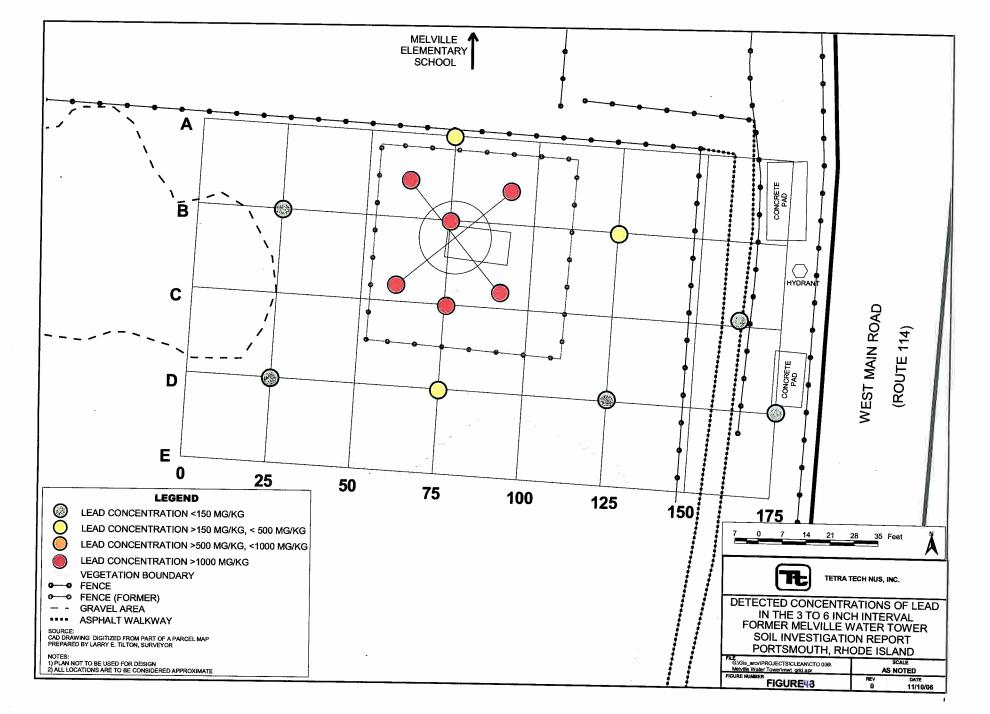
The storage location will be well marked with proper signage, protective bumper poles and will have straight through access/egress for vehicles.

Hazard Monitoring Required:	Decontamination Procedures:	Permits/Requirements:
Dust Control/Monitoring:	See Table 4-2 Decontamination Hazard	Each truck leaving the site will have a signed
 Monitoring instrument (Particulate Meter) 	Analysis.	manifest.
Operations – The action level for this		That moot
instrument will be 2.5 mg/m ³ . This level is		It will be at the discretion of the FOL, however,
based on the calculation representing		it is recommended that based on the limited
source concentrations.		numbers that a Load Inspection Report be
 Visible dust concentrations are generally 		completed for each load as well.
visible at airborne concentrations of 2.5		, and an analytical activities
mg/m³ and greater. Reaching this action		
level will trigger water suppression to be put		
in place		
 For real time onsite qualitative analysis, 		
NIOSH Method #7700 Lead Check Test Kit		
will be employed. Essentially, a volume		
sample 10-240 liters will be collected using		
an air sampling pump and a 0.8µm cellulose		
ester membrane filter with a flow rate of 2		
L/min for a minimum collection of 10 liters.		
Once the necessary volume is collected the		
filter will be removed and spot checked with		
a Lead Check test swab to determine the		
presence of lead on the filter membrane. If		
there is a color change indicates lead is	·	
present. Based on this at least one air		
sample will be collected to represent this job	ļ	
classification. NIOSH Method #7300 will be		
employed as the protocol to collect airborne		
lead air sample.		
It is recommended that the SKC Personal Dust		
Monitor (HazDust IV) be employed for the above monitoring activities.		
Response to Achieving Action Levels:		
ricoportise to Actileving Action Levels:		
Positive results in any of the areas above will require		
Water suppression during loading operations		
when visible dust and monitoring indicates		
action levels have been achieved.		
 Presoaking of intended grids to be treated 		
and mixed using the water truck.		
Use of selected respiratory protection. The selected		
subcontractor will provide their own Competent		
The state of the provide their own competent		

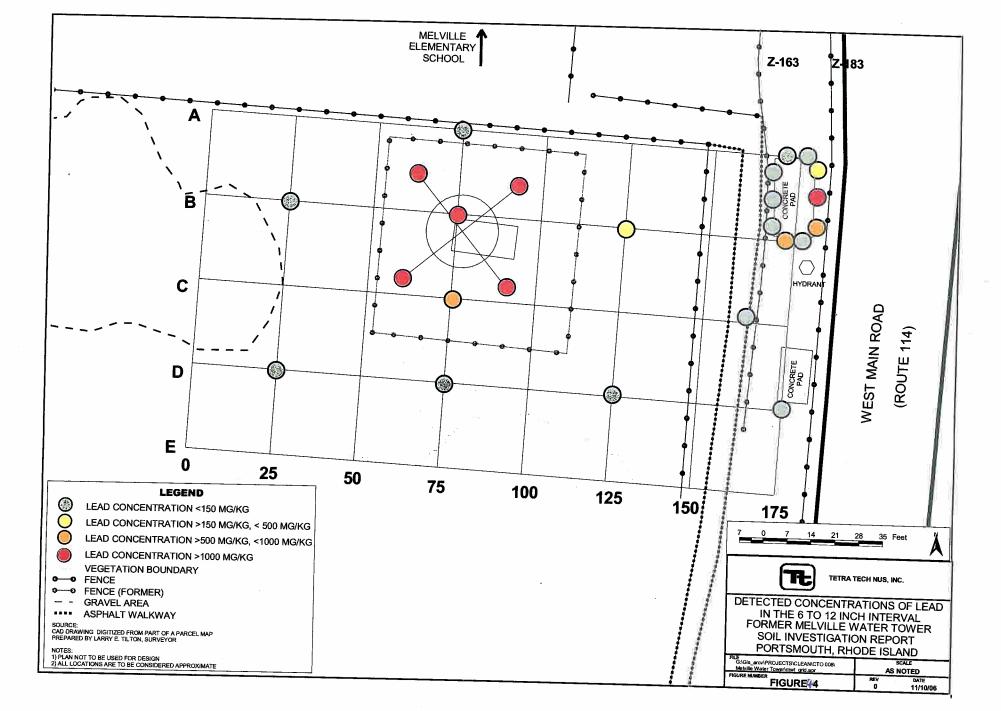
Person and Respiratory Program elements for the personnel to follow.	eir		
	PPE Requirer	nents	
Hard hats, safety glasses, high visibility vests, steresistant overboots are required when entering the footwear. Caution should be exercised when working outdoor the face neck and ears; liberal use of sunscreen;	eel toe work boots are the more excavation area and estal	inimum requirement olished exclusion zo	ne where lead dusts may be picked up on
Training Required	Emergency Equipment	H&S Supporting	Program Requirements
- 40-Hour HAZWOPER General Site Worker	- First Aid Kit	,	· · · · · · · · · · · · · · · · · · ·
 8-Hour HAZWOPER General Site Worker Refresher Training 8-Hour HAZWOPER General Site Worker Supervisory Training Review of this HASP Review of the On-site Contractors HASP 	- Emergency Contact List and Map to Hospital (Posted and placed in the first-aid kit)	Respiratory Protect	ction Program, See Section 9.0 of the HSGM.
Medical Clearance/Surveillance Required - Medically qualified under 29 1910.120(f) - Completed a Medical Data Sheet (See Mobilization/Demobilization Safe Work Packet)			

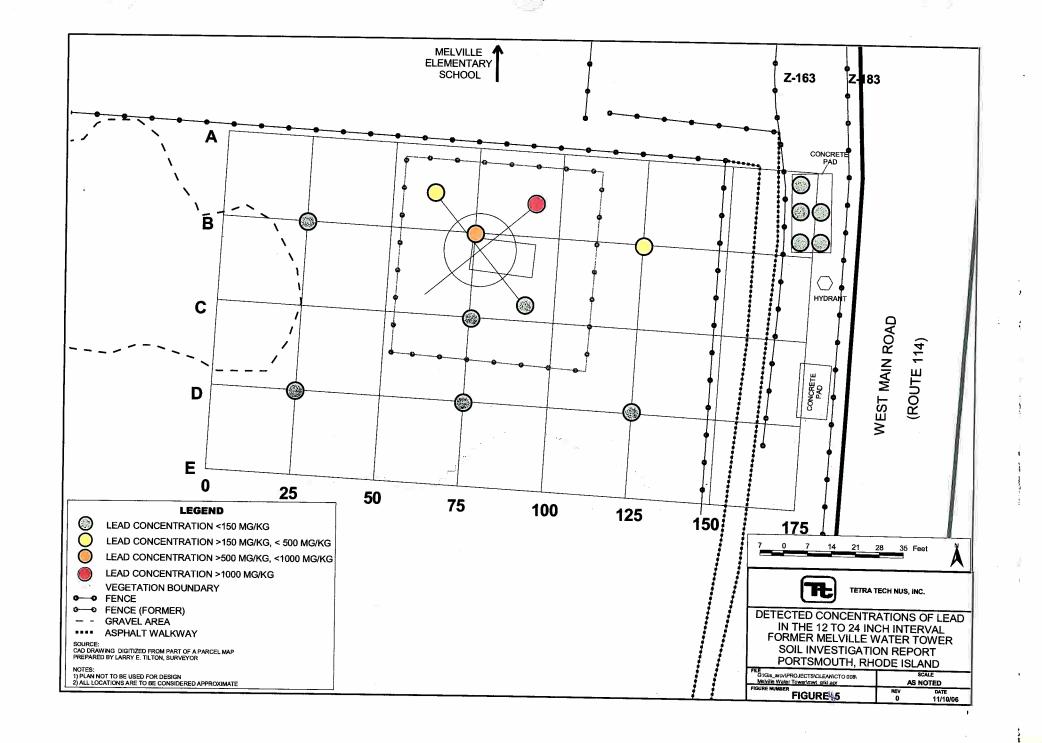






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Pb

MW: 207.19

CAS: 7439-92-1

RTECS: OF7525000

METHOD: 7700, Issue 1

EVALUATION: PARTIAL

Issue 1: 15 May 1996

OSHA: 0.05 mg/m3 NIOSH: <0.1 mg/m³ ACGIH: 0.15 mg/m³

PROPERTIES:

soft metal; d 11.3 g/cm3; MP 327.5 °C;

valences +2, +4 in saits

SYNONYMS: None

SAMPLING

MEASUREMENT

SAMPLER:

FILTER

(0.8-µm cellulose ester membrane)

TECHNIQUE:

CHEMICAL SPOT TEST KIT

(Rhodizonate-based)

FLOW RATE:

2 L/min [1]

ANALYTE:

rhodizonate complex of lead

VOL-MIN: -MAX:

POSITIVE

10 L @ 0.05 mg/m³[1] 240 L

INDICATOR:

yellow/orange to pink/red color change

(under acidic conditions) [2]

SAMPLE

STABILITY:

stable

PERFORMANCE **PARAMETERS:**

Positive result:

≥ 0.57 µg Pb @ 95% confidence level [1]

FIELD BLANKS: 2 to 10 per set (for laboratory analysis)

Negative result: ≤ 10.2 µg Pb @ 95% confidence level [1]

ACCURACY

RANGE STUDIED:

<0.01 to >100.0 µg Pb per filter

BIAS:

not applicable

OVERALL PRECISION 6,.):

not applicable

ACCURACY:

not applicable

APPLICABILITY: This is a qualitative method only, designed for use in the field. A characteristic color change indicates the presence of lead above a certain mass, as determined by performance parameters for a given test kit. If quantitative results are needed, the filter samples, test kit components, and backup pads may be shipped to the laboratory for analysis by NIOSH methods 7300, 7082, 7105, or equivalent.

INTERFERENCES: TI*, Ag*, Cd²*, Ba²*, and Sn²* also form colored compounds with sodium rhodizonate, but with less sensitivity than that of Pb2+, and only the lead-rhodizonate complex gives the characteristic red color [2].

OTHER METHODS: Laboratory methods for the determination of lead include NIOSH methods 7300 (Elements by ICP), 7082 (Lead by Flame AAS), and 7105 (Lead by Graphite Furnace AAS). ASTM E 1553 is an alternate sample collection procedure [3].

REAGENTS:

 Rhodizonate-based spot test kit (Merck EM Quant Lead Test™ or equivalent).

NOTE 1:

Rhodizonate may degrade quickly over time. Follow manufacturer's recommendations for maintaining viability of reagents.

NOTE 2:

Performance parameters on page 7700-1 apply only to Merck EM

Quant Test kit (See APPENDIX).

EQUIPMENT:

- Sampler: Cellulose ester membrane filter, 0.8-µm pore size, 37-mm, in 2- or 3-piece cassette with cellulose backup pad.
- 2. Personal sampling pump, 1 to 4 L/min, with flexible connecting tubing.
- 3. Sealable plastic bags.
- 4. Gloves, powderless, plastic

SPECIAL PRECAUTIONS: None

SAMPLING:

- 1. Calibrate each personal sampling pump with a representative sampler in line.
- 2. Sample at an accurately known flow rate between 1 and 4 L/min (2 L/min recommended) for a total sample size of 10 to 240 L.

SPOT TESTING (Qualitative measurement):

- 3. Don a clean pair of gloves.
- 4. Using an appropriate tool, remove the top portion of the filter cassette (after sample has been collected for desired time period).
- 5. Apply the spot test to the center of the filter, following manufacturer's instructions.
- 6. Record results as positive for lead if a characteristic color change is observed, or negative if no characteristic color change is observed.

NOTE: For rhodizonate-based lead spot tests (under acidic conditions), the characteristic color change is from yellow or orange to pink or red [2].

LABORATORY ANALYSIS (Optional):

- Re-cap filter cassettes.
- 8. Place filter samples and test kit components in resealable plastic bag for shipment to laboratory.
- 9. Analyze by NIOSH method 7300, 7082, 7105, or equivalent method for lead.

NOTE: The backup pad must be analyzed for lead that may have wicked through the filter during qualitative measurement (step 5 above).

EVALUATION OF METHOD:

A commercial rhodizonate-based spot test kit (Merck EM Quant Lead TestTM) was evaluated for its potential use in the detection of lead in airborne particulate [1]. Personal sampling pumps were used to collect 371 air samples on cellulose ester membrane filters at various worksites where lead was a suspected air contaminant. Each filter sample was tested with an individual chemical spot test, and the samples (test kits included) were then analyzed using NIOSH method 7105. Experimental data were statistically modeled in order to estimate the performance parameters of the spot test kit (see APPENDIX). A positive reading was found at 95% confidence for lead mass values above 10.2 μg Pb per filter, while 95% confidence of a negative reading was found for lead masses below 0.57 μg Pb per filter.

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APPENDIX: CALCULATION OF PERFORMANCE PARAMETERS

Example calculations are illustrated here for the performance parameters of the Merck EM Quant Lead TestTM; performance parameters for other spot test kits should be estimated by statistical modeling before being used for field screening applications. Note that these calculations assume that the short-term exposures are representative of a full 8-h workday.

Consider first the case of a positive test result after 5 min of sampling at 2.0 L/min (minimum lead mass of 0.57 µg for a total sampling volume of 10 L):

 $0.057 \,\mu g \,Pb/L \,(X \,1000 \,L/m^3) = 57 \,\mu g \,Pb/m^3$

which is in excess of the OSHA permissible exposure limit (PEL) of 50 μg/m³ for an 8-h workday.

Consider secondly the case of a negative test result after 2 h of sampling at 2.0 L/min (maximum lead mass of 10.2 µg for a total sampling volume of 240 L):

 $0.0425 \mu g Pb/L (X 1000 L/m^3) = 42.5 \mu g Pb/m^3$

which is below the OSHA PEL for an 8-h workday.

Similar computations may be carried out for other sampling volumes and spot test kits, provided that the performance parameters for the test kits are known.

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ELEMENTS by ICP (Nitric/Perchloric Acid Ashing)

MW: Table 1

CAS: Table 2

RTECS: Table 2

METHOD: 7300, Issue 3 **EVALUATION: PARTIAL** Issue 1: 15 August 1990 Issue 3: 15 March 2003 OSHA: Table 2 PROPERTIES: Table 1 NIOSH: Table 2 ACGIH: Table 2 **ELEMENTS:** aluminum* calcium lanthanum nickel strontium tungsten* antimony* chromium* lithium* potassium tellurium vanadium* arsenic cobalt* magnesium phosphorus tin yittrium barium copper manganese* selenium thallium zinc beryllium* iron molybdenum* titanium zirconium* cadmium lead* *Some compounds of these elements require special sample treatment. SAMPLING MEASUREMENT SAMPLER: **FILTER TECHNIQUE:** INDUCTIVELY COUPLED ARGON (0.8-µm, cellulose ester membrane, or PLASMA, ATOMIC EMISSION 5.0-µm, polyvinyl chloride membrane) SPECTROSCOPY (ICP-AES) 1 to 4 L/min FLOWRATE: ANALYTE: elements above VOL-MIN: Table 1 **ASHING** -MAX: Table 1 REAGENTS: conc. HNO₃/ conc. HClO₄ (4:1), 5 mL; 2mL increments added as needed SHIPMENT: routine CONDITIONS: room temperature, 30 min; 150 °C to near SAMPLE dryness STABILITY: stable **FINAL** SOLUTION: 4% HNO₃, 1% HClO₄, 25 mL **BLANKS:** 2 to 10 field blanks per set WAVELENGTH: depends upon element; Table 3 **ACCURACY** BACKGROUND CORRECTION: spectral wavelength shift **CALIBRATION:** RANGE STUDIED: elements in 4% HNO₃, 1% HClO₄ not determined RANGE: BIAS: not determined varies with element [1] ESTIMATED LOD: Tables 3 and 4 OVERALL PRECISION (Ŝ,,): not determined PRECISION (§): Tables 3 and 4 ACCURACY: not determined

APPLICABILITY: The working range of this method is 0.005 to 2.0 mg/m³ for each element in a 500-L air sample. This is simultaneous elemental analysis, not compound specific. Verify that the types of compounds in the samples are soluble with the ashing procedure selected.

INTERFERENCES: Spectral interferences are the primary interferences encountered in ICP-AES analysis. These are minimized by judicious wavelength selection, interelement correction factors and background correction [1-4].

OTHER METHODS: This issue updates issues 1 and 2 of Method 7300, which replaced P&CAM 351 [3] for trace elements. Flame atomic absorption spectroscopy (e.g., Methods 70XX) is an alternate analytical technique for many of these elements. Graphite furnace AAS (e.g., 7102 for Be, 7105 for Pb) is more sensitive.

REAGENTS:

- 1. Nitric acid (HNO₃), conc., ultra pure.
- 2. Perchloric acid (HClO₄), conc., ultra pure.*
- Ashing acid: 4:1 (v/v) HNO₃:HCIO₄. Mix 4 volumes conc. HNO₃ with 1 volume conc. HCIO₄.
- Calibration stock solutions, 1000 μg/mL.
 Commercially available, or prepared per instrument manufacturer's recommendation (see step 12).
- Dilution acid, 4% HNO₃, 1% HClO₄. Add 50 mL ashing acid to 600 mL water; dilute to 1 L.
- 6. Argon.
- 7. Distilled, delonized water.
 - See SPECIAL PRECAUTIONS.

EQUIPMENT:

- Sampler: cellulose ester membrane filter, 0.8-µm pore size; or polyvinyl chloride membrane, 5.0-µm pore size; 37-mm diameter, in cassette filter holder.
- Personal sampling pump, 1 to 4 L/min, with flexible connecting tubing.
- Inductively coupled plasma-atomic emission spectrometer, equipped as specified by the manufacturer for analysis of elements of interest.
- 4. Regulator, two-stage, for argon.
- Beakers, Phillips, 125-mL, or Griffin, 50-mL, with watchglass covers.**
- 6. Volumetric flasks, 10-, 25-,100-mL., and 1-L**
- 7. Assorted volumetric pipets as needed.**
- 8. Hotplate, surface temperature 150 °C.
 - ** Clean all glassware with conc. nitric acid and rinse thoroughly in distilled water before use.

SPECIAL PRECAUTIONS: All perchloric acid digestions are required to be done in a perchloric acid hood. When working with concentrated acids, wear protective clothing and gloves.

SAMPLING:

- 1. Calibrate each personal sampling pump with a representative sampler in line.
- 2. Sample at an accurately known flow rate between 1 and 4 L/min for a total sample size of 200 to 2000 L (see Table 1) for TWA measurements. Do not exceed a filter loading of approximately 2 mg total dust.

SAMPLE PREPARATION:

- 3. Open the cassette filter holders and transfer the samples and blanks to clean beakers.
- 4. Add 5 mL ashing acid. Cover with a watchglass. Let stand 30 min at room temperature. NOTE: Start a reagent blank at this step.
- Heat on hotplate (120 °C) until ca. 0.5 mL remains.
 - NOTE 1: Recovery of lead from some paint matrices may require other digestion techniques. See Method 7082 (Lead by Flame AAS) for an alternative hotplate digestion procedure or Method 7302 for a microwave digestion procedure.
 - NOTE 2: Some species of Al, Be, Co, Cr, Li, Mn, Mo, V, and Zr will not be completely solubilized by this procedure. Alternative solubilization techniques for most of these elements can be found elsewhere [5-10]. For example, aqua regia may be needed for Mn [6,12].
- 6. Add 2 mL ashing acid and repeat step 5. Repeat this step until the solution is clear.
- 7. Remove watchglass and rinse into the beaker with distilled water.
- 8. Increase the temperature to 150 °C and take the sample to near dryness (ca. 0.5 mL).
- 9. Dissolve the residue in 2 to 3 mL dilution acid.
- 10. Transfer the solutions quantitatively to 25-mL volumetric flasks.
- 11. Dilute to volume with dilution acid.
 - NOTE: If more sensitivity is required, the final sample volume may be held to 10 mL.

CALIBRATION AND QUALITY CONTROL:

12. Calibrate the spectrometer according to the manufacturers recommendations.

NOTE: Typically, an acid blank and 1.0 µg/mL multielement working standards are used. The following multielement combinations are chemically compatible in 4% HNO₃/1% HClO₄:

- a. Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, La, In, Na
- b. Ag, K, Li, Mg, Mn, Ni, P, Pb, Se, Sr, Tl, V, Y, Zn, Sc
- c. Mo, Sb, Sn, Te, Ti, W, Zr
- d. Acid blank
- 13. Analyze a standard for every ten samples.
- 14. Check recoveries with at least two spiked blank filters per ten samples.

MEASUREMENT:

- 15. Set spectrometer to conditions specified by manufacturer.
- 16. Analyze standards and samples.

NOTE: If the values for the samples are above the range of the standards, dilute the solutions with dilution acid, reanalyze and apply the appropriate dilution factor in the calculations.

CALCULATIONS:

- Obtain the solution concentrations for the sample, C_s (μg/mL), and the average media blank, C_b (μg/mL), from the instrument.
- 18. Using the solution volumes of sample, V_s (mL), and media blank, V_b (mL), calculate the concentration, C (mg/m³), of each element in the air volume sampled, V (L):

$$C = \frac{CsVs - CbVb}{V}, mg / m^3$$

NOTE: µg/L ≡ mg/m³

EVALUATION OF METHOD:

Issues 1 and 2

Method, 7300 was originally evaluated in 1981 [2,3]. The precision and recovery data were determined at 2.5 and 1000 μg of each element per sample on spiked filters. The measurements used for the method evaluation in Issues 1 and 2 were determined with a Jarrell-Ash Model 1160 Inductively Coupled Plasma Spectrometer operated according to manufacturer's instructions.

Issue 3

In this update of NIOSH Method 7300, the precision and recovery data were determined at approximately 3x and 10x the instrumental detection limits on commercially prepared spiked filters [12] using 25.0 mL as the final sample volume. Tables 3 and 4 list the precision and recovery data, instrumental detection limits, and analytical wavelengths for mixed cellulose ester (MCE) and polyvinyl chloride (PVC) filters. PVC Filters which can be used for total dust measurements and then digested for metals measurements were tested and found to give good results. The values in Tables 3 and 4 were determined with a Spectro Analytical Instruments Model End On Plasma (EOP)(axial) operated according to manufacturer's instructions.

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Method originally written by Mark Millson, NIOSH/DART, and R. DeLon Hull, Ph.D., NIOSH/DSHEFS, James B. Perkins, David L. Wheeler, and Keith Nicholson, DataChem Labortories, Salt Lake City, UT.

TABLE 1. PROPERTIES AND SAMPLING VOLUMES

Element	Atomic		Air Volume, L @ OSHA PEL		
_(Symbol)	Weight	MP, °C	MIN	MAX	
Silver (Ag)	107.87	961	250	2000	
Aluminum (AI)	26.98	660	5	100	
Arsenic (As)	74.92	817	5	2000	
Barium (Ba)	137.34	710	50	2000	
Beryllium (Be)	9.01	1278	1250	2000	
Calcium (Ca)	40.08	842	5	200	
Cadmium (Cd)	112.40	321	13	2000	
Cobalt (Co)	58.93	1495	25	2000	
Chromium (Cr)	52.00	1890	5	1000	
Copper (Cu)	63.54	1083	5	1000	
Iron (Fe)	55.85	1535	5	100	
Potassium (K)	39.10	63.65	5	1000	
Lanthanum	138.91	920	5	1000	
Lithium (Li)	6.94	179	100	2000	
Magnesium (Mg)	24.31	651	5	67	
Manganese (Mn)	54.94	1244	5	200	
Molybdenum (Mo)	95.94	651	5	67	
Nickel (Ni)	58.71	1453	5	1000	
Phosphorus (P)	30.97	44	25	2000	
Lead (Pb)	207.19	328	50	2000	
Antimony (Sb)	121.75	630.5	50	2000	
Selenium (Se)	78.96	217	13	2000	
Tin (Sn)	118.69	231.9	5	1000	
Strontium (Sr)	87.62	769	10	1000	
Tellurium (Te)	127.60	450	25	2000	
Titanium (Ti)	47.90	1675	5	100	
Thallium (TI)	204.37	304	25	2000	
Vanadium (V)	50.94	1890	5	2000	
Tungsten (W)	183.85	3410	5	1000	
Yttrium (Y)	88.91	1495	5	1000	
Zinc (Zn)	65.37	419	5	200	
Zirconium (Zr)	91.22	1852	5	200	

TABLE 2. EXPOSURE LIMITS, CAS #, RTECS

Element (Symbol)	CAS#	RTECS	Exposure Limits, mg/m³ (Ca = carcinogen) OSHA NIOSH ACC			
Silver (Ag)	7440-22-4	VW3500000	0.01 (dust, fume, metal)	0.01 (metal, soluble)	0.1 (metal) 0.01 (soluble)	
Aluminum (Al)	7429-90-5	BD0330000	15 (total dust) 5 (respirable)	10 (total dust) 5 (respirable fume) 2 (salts, alkyls)	10 (dust) 5 (powders, fume) 2 (salts, alkyls)	
Arsenic (As)	7440-38-2	CG0525000	varies	C 0.002, Ca	0.0 1 , Ca	
Barium (Ba)	7440-39-3	CQ8370000	0.5	0.5	0.5	
Beryllium (Be)	7440-41-7	DS1750000	0.002, C 0.005	0.0005, Ca	0.002, Ca	
Calcium (Ca)	7440-70-2		varies	varies	varies	
Cadmium (Cd)	7440-43-9	EU9800000	0.005	lowest feasible, Ca	0.01 (total), Ca 0.002 (respir.), Ca	
Cobalt (Co)	7440-48-4	GF8750000	0.1	0.05 (dust, fume)	0.02 (dust, fume)	
Chromium (Cr)	7440-47-3	GB4200000	0.5	0.5	0.5	
Copper (Cu)	7440-50-8	GL5325000	1 (dust, mists) 0.1 (fume)	1 (dust) 0.1 (fume)	1 (dust, mists) 0.2 (fume)	
Iron (Fe)	7439-89-6	NO4565500	10 (dust, fume)	5 (dust, fume)	5 (fume)	
Potassium (K)	7440-09-7	TS6460000			***	
Lanthanum	7439-91-0		-	-	***	
Lithium (Li)	7439-93-2					
Magnesium (Mg)	7439-95-4	OM2100000	15 (dust) as oxide 5 (respirable)	10 (fume) as oxide	10 (fume) as oxide	
Manganese (Mn)	7439-96-5	OO9275000	C 5	1; STEL 3	5 (dust) 1; STEL 3 (fume)	
Molybdenum (Mo)	7439-98-7	QA4680000	5 (soluble) 15 (total insoluble)	5 (soluble) 10 (insoluble)	5 (soluble) 10 (insoluble)	
Nickel (Ni)	7440-02-0	QR5950000	1	0.015, Ca	0.1 (soluble) 1 (insoluble, metal)	
Phosphorus (P)	7723-14-0	TH3500000	0.1	0.1	0.1	
Lead (Pb)	7439-92-1	OF7525000	0.05	0.05	0.05	
Antimony (Sb)	7440-36-0	CC4025000	0.5	0.5	0.5	
Selenium (Se)	7782-49-2	VS7700000	0.2	0.2	0.2	
Tin (Sn)	7440-31-5	XP7320000	2	2	2	
Strontium (Sr)	7440-24-6	-	-		***	
Tellurium (Te)	13494-80-9	WY2625000	0.1	0.1	0.1	
Titanium (Ti)	7440-32-6	XR1700000	****			
Thallium (TI)	7440-28-0	XG3425000	0.1 (skin) (soluble)	0.1 (skin) (soluble)	0.1 (skin)	
Vanadium (V)	7440-62-2	YW240000	4=	C 0.05	10-al	
Tungsten	7440-33-7	-	5	5 10 (STEL)	5 10 (STEL)	
Yttrium (Y)	7440-65-5	ZG2980000	1	N/A	1	
Zinc (Zn)	7440-66-6	ZG8600000				
Zirconium (Zr)	7440-67-7	ZH7070000	5	5, STEL 10	5, STEL 10	

TABLE 3. MEASUREMENT PROCEDURES AND DATA [1]. Mixed Cellulose Ester Filters (0.45 μm)

	wavelength	Est. LOD	LOD	Certified	% Recovery	Percent	Certified	%	Percent
Element	nm	μg/	ng/m L	3x LOD	(c)	RSD	10x LOD	Recovery	RSD
(a)		Filter		(b)	(-)	(N=25)	(b)	(c)	(N=25)
							\~/	(111 207
Ag	328	0.042	1.7	0.77	102.9	2.64	3.21	98.3	1.53
A۱	167	0.115	4.6	1.54	105.4	11.5	6.40	101.5	1.98
As	189	0.140	5.6	3.08	94.9	2.28	12.9	93.9	1.30
Ва	455	0.005	0.2	0.31	101.8	1.72	1.29	97.7	0.69
Ве	313	0.005	0.2	0.31	100.0	1.44	1.29	98.4	0.75
Ca	317	0.908	36.3	15.4	98.7	6.65	64.0	100.2	1.30
Cd	226	0.0075	0.3	0.31	99.8	1.99	1.29	97.5	0.88
Co	228	0.012	0.5	0.31	100.8	1.97	1.29	98.4	0.90
Cr	267	0.020	0.8	0.31	93.4	16.3	1.29	101.2	2.79
Cu	324	0.068	2.7	1.54	102.8	1.47	6.40	100.6	0.92
Fe	259	0.095	3.8	1.54	103.3	5.46	6.40	98.0	0.95
K	766	1.73	69.3	23.0	90.8	1.51	96.4	97.6	0.80
La	408	0.048	1.9	0.77	102.8	2.23	3.21	100.1	0.92
Li	670	0.010	0.4	0.31	110.0	1.91	1.29	97.7	0.81
Mg	279	0.098	3.9	1.54	101.1	8.35	6.40	98.0	1.53
Mn	257	0.005	0.2	0.31	101.0	1.77	1.29	94.7	0.73
Мо	202	0.020	0.8	0.31	105.3	2.47	1.29	98.6	1.09
Ni	231	0.020	0.8	0.31	109.6	3.54	1.29	101.2	1.38
Р	178	0.092	3.7	1.54	84.4	6.19	6.40	82.5	4.75
Pb	168	0.062	2.5	1.54	109.4	2.41	6.40	101.7	0.88
Sb	206	0.192	7.7	3.08	90.2	11.4	12.9	41.3	32.58
Se	196	0.135	5.4	2.3	87.6	11.6	9.64	84.9	4.78
Sn	189	0.040	1.6	0.77	90.2	18.0	3.21	49	21.79
Sr	407	0.005	0.2	0.31	101.0	1.55	1.29	97.3	0.65
Te	214	0.078	3.1	1.54	102.0	2.67	6.40	97.4	1.24
Ti	334	0.050	2.0	0.77	98.4	2.04	3.21	93.4	1.08
TI	190	0.092	3.7	1.54	100.9	2.48	6.40	99.1	0.80
V	292	0.028	1.1	0.77	103.2	1.92	3.21	98.3	0.84
W	207	0.075	3.0	1.54	72.2	10.1	6.40	57.6	14.72
Υ	371	0.012	0.5	0.31	100.5	1.80	1.29	97.4	0.75
Zn	213	0.310	12.4	4.60	102.2	1.87	19.3	95.3	0.90
Zr	339	0.022	0.9	0.31	88.0	19.4	1.29	25	57.87

⁽a) Bold values are qualitative only because of low recovery.

⁽b) Values are certified by Inorganic Ventures INC. at 3x and 10x the approximate instrumental LOD

⁽c) Values reported were obtained with a Spectro Analytical Instruments EOP ICP; performance may vary with instrument and should be independently verified.

TABLE 4. MEASUREMENT PROCEDURES AND DATA [1]. Polyvinyl Chloride Filter (5.0 µm)

(c) filter (b) (a) (N=25) (b) (a) (N=25) Ag 328 0.042 1.7 0.78 104.2 8.20 3.18 81.8 18.9 Al 167 0.115 4.6 1.56 77.4 115.24 6.40 92.9 20.9 As 189 0.140 5.6 3.10 100.7 5.13 12.70 96.9 3.2 Ba 455 0.005 0.2 0.31 106.8 3.53 1.270 102.8 2.1 Ca 317 0.908 36.3 15.6 68.1 12.66 64.00 96.8 5.3 Cd 226 0.0075 0.3 0.31 105.2 5.57 1.27 101.9 2.8 Co 228 0.012 0.5 0.31 109.3 4.67 1.27 101.9 2.8 Cr 267 0.020 0.8 0.31 109.3 4.67 1.27		wavelength		LOD	Certified	%		Certified 17	%	Percent
Agg 328 0.042 1.7 0.78 104.2 8.20 3.18 81.8 18.9 Al 167 0.115 4.6 1.56 77.4 115.24 6.40 92.9 20.9 As 189 0.140 5.6 3.10 100.7 5.13 12.70 96.9 3.2 Ba 455 0.005 0.2 0.31 102.4 3.89 1.270 99.8 2.0 Be 313 0.005 0.2 0.31 106.8 3.53 1.270 102.8 2.1 Ca 317 0.908 36.3 15.6 68.1 12.66 64.00 96.8 5.3 Cd 226 0.0075 0.3 0.31 109.3 4.67 1.27 101.9 2.8 Co 228 0.012 0.5 0.31 109.3 4.67 1.27 101.9 2.8 Cr 267 0.020 0.8 0.31 109.4 5.31 1.27 103.4 4.1 Cu 324 0.068 2.7 1.56 104.9 5.18 6.40 99.1 9.7 K 766 1.73 69.3 23.4 96.4 4.70 95.00 99.2 2.2 La 408 0.048 1.9 0.78 45.5 4.19 3.18 98.8 2.6 Li 670 0.010 0.4 0.31 107.7 4.80 1.27 110.4 2.7 Mg 279 0.098 3.9 1.56 54.8 20.59 6.40 64.5 5.7 Mn 257 0.020 0.8 0.31 101.9 4.18 1.27 99.3 2.4 Mo 202 0.020 0.8 0.31 101.9 4.18 1.27 99.3 2.4 Mo 202 0.020 0.8 0.31 107.7 4.80 1.27 110.4 2.7 Mg 279 0.098 3.9 1.56 54.8 20.59 6.40 64.5 5.7 Mn 257 0.005 0.2 0.31 101.9 4.18 1.27 99.3 2.4 Mo 202 0.020 0.8 0.31 101.9 4.18 1.27 99.3 2.4 Mo 202 0.020 0.8 0.31 101.9 4.18 1.27 99.3 2.4 Mo 202 0.020 0.8 0.31 101.9 4.18 1.27 99.3 2.4 Mo 202 0.020 0.8 0.31 101.9 4.18 1.27 99.3 2.4 Mo 202 0.020 0.8 0.31 101.9 4.18 1.27 99.3 2.4 Mo 202 0.020 0.8 0.31 101.9 17.82 6.40 86.5 10.4 Pb 168 0.062 2.5 1.56 101.9 17.82 6.40 86.5 10.4 Pb 168 0.062 2.5 1.56 101.9 17.82 6.40 86.5 10.4 Pb 168 0.062 2.5 1.56 101.9 17.82 6.40 86.5 10.4 Pb 168 0.062 2.5 1.56 101.9 17.82 6.40 86.5 10.4 Pb 168 0.062 2.5 1.56 101.9 17.82 6.40 86.5 10.4 Pb 168 0.062 2.5 1.56 101.9 17.82 6.40 86.5 10.4 Pb 168 0.062 2.5 1.56 101.9 17.82 6.40 86.5 10.4 Pb 168 0.062 2.5 1.56 101.9 17.82 6.40 86.5 10.4 Pb 168 0.062 2.5 1.56 101.9 17.82 6.40 86.5 10.4 Pb 168 0.062 2.5 1.56 101.9 17.82 6.40 86.5 10.4 Pb 168 0.062 2.5 1.56 101.9 17.82 6.40 86.5 10.4 Pb 168 0.062 2.5 1.56 101.9 17.82 6.40 86.5 10.4 Pb 168 0.062 2.5 1.56 101.9 17.82 6.40 86.5 10.4 Pb 168 0.062 2.5 1.56 101.9 17.82 6.40 86.5 10.4 Pb 168 0.062 2.5 1.56 101.9 17.82 6.40 86.5 10.4 Pb 168 0.062 2.5 1.56 101.9 17.82 6.40 80.5 10.4 Pb 168 0.062 2.5 1.56 101.9 17.82 6.40 80.5 10.4 Pb 168 0.062 2.5 1.56	Element	nm	µg per	ng/mL	3x LOD	Recovery	RSD	10x LOD	Recovery	RSD
Al 167 0.115 4.6 1.56 77.4 115.24 6.40 92.9 20.9 As 189 0.140 5.6 3.10 100.7 5.13 12.70 96.9 3.2 Ba 455 0.005 0.2 0.31 102.4 3.89 1.270 99.8 2.0 Be 313 0.005 0.2 0.31 106.8 3.53 1.270 102.8 2.1 Ca 317 0.908 36.3 15.6 68.1 12.66 64.00 96.8 5.3 Cd 226 0.0075 0.3 0.31 105.2 5.57 1.27 101.9 2.8 Co 228 0.012 0.5 0.31 109.3 4.67 1.27 101.9 2.8 Cr 267 0.020 0.8 0.31 109.4 5.31 1.27 103.4 4.1 Fe 259 0.095 3.8 1.56 88.7 46.82 6.40 99.1 9.7 K 766 1.73 69.3 23.4 96.4 4.70 95.00 99.2 2.2 La 408 0.048 1.9 0.78 45.5 4.19 31.8 98.8 2.6 Li 670 0.010 0.4 0.31 107.7 4.80 1.27 110.4 2.7 Mg 279 0.098 3.9 1.56 54.8 20.59 6.40 64.5 5.7 Mn 257 0.005 0.2 0.31 101.9 4.18 1.27 99.3 2.4 Mo 202 0.020 0.8 0.31 101.9 4.18 1.27 99.3 2.4 Mo 202 0.020 0.8 0.31 101.9 4.18 1.27 99.3 2.4 Mo 202 0.020 0.8 0.31 101.9 5.89 1.27 103.6 3.2 P 178 0.092 3.7 1.56 101.9 17.82 6.40 86.5 10.4 Pb 168 0.062 2.5 1.56 109.6 6.12 6.40 103.2 2.9 Sb 206 0.192 7.7 3.10 64.6 22.54 2.70 38.1 30.5 Se 196 0.135 5.4 2.30 83.1 71.8 4.09 1.27 103.6 3.2 Sn 189 0.040 1.6 0.78 85.7 27.29 3.18 52.0 29.4 Sr 407 0.005 0.2 0.31 71.8 4.09 1.27 81.2 2.7 Te 214 0.078 3.1 1.56 109.6 6.12 6.40 103.2 2.9 Sr 407 0.005 0.2 0.31 71.8 4.09 1.27 81.2 2.7 Te 214 0.078 3.1 1.56 109.6 6.12 6.40 97.3 3.8 Ti 334 0.050 2.0 0.78 101.0 9.46 3.18 92.4 5.5 Ti 190 0.092 3.7 1.56 110.3 4.04 6.40 101.9 2.0 V 292 0.028 1.1 0.78 108.3 3.94 3.18 102.5 2.6 W 207 0.075 3.0 1.56 74.9 110.5 3.63 1.27 101.4 2.5 Zn 213 0.310 12.4 4.70 91.0 68.69 19.1 101.0 9.6	(C)		filter		(b)	(a)	(N=25)	(b)	(a)	(N=25)
Al 167 0.115 4.6 1.56 77.4 115.24 6.40 92.9 20.9 As 189 0.140 5.6 3.10 100.7 5.13 12.70 96.9 3.2 Ba 455 0.005 0.2 0.31 102.4 3.89 1.270 99.8 2.0 Be 313 0.005 0.2 0.31 106.8 3.53 1.270 102.8 2.1 Ca 317 0.908 36.3 15.6 68.1 12.66 64.00 96.8 5.3 Cd 226 0.0075 0.3 0.31 105.2 5.57 1.27 101.9 2.8 Co 228 0.012 0.5 0.31 109.3 4.67 1.27 101.9 2.8 Cr 267 0.020 0.8 0.31 109.4 5.31 1.27 103.4 4.1 Fe 259 0.095 3.8 1.56 88.7 46.82 6.40 99.1 9.7 K 766 1.73 69.3 23.4 96.4 4.70 95.00 99.2 2.2 La 408 0.048 1.9 0.78 45.5 4.19 3.18 98.8 2.6 Li 670 0.010 0.4 0.31 107.7 4.80 1.27 110.4 2.7 Mg 279 0.098 3.9 1.56 54.8 20.59 6.40 64.5 5.7 Mn 257 0.005 0.2 0.31 101.9 4.18 1.27 99.3 2.4 Mo 202 0.020 0.8 0.31 101.9 4.18 1.27 99.3 2.4 Mo 202 0.020 0.8 0.31 101.9 4.18 1.27 99.3 2.4 Mo 202 0.020 0.8 0.31 101.9 5.89 1.27 103.6 3.2 P 178 0.092 3.7 1.56 101.9 17.82 6.40 86.5 10.4 Pb 168 0.062 2.5 1.56 109.6 6.12 6.40 103.2 2.9 Sb 206 0.192 7.7 3.10 64.6 22.54 12.70 38.1 30.5 Se 196 0.135 5.4 2.30 83.1 71.8 4.09 1.27 81.2 2.9 Sr 407 0.005 0.2 0.31 71.8 4.09 1.27 81.2 2.9 Sr 407 0.005 0.2 0.31 71.8 4.09 1.27 81.2 2.7 Te 214 0.078 3.1 1.56 109.6 6.12 6.40 103.2 2.9 Sr 407 0.005 0.2 0.31 71.8 4.09 1.27 81.2 2.7 Te 214 0.078 3.1 1.56 109.6 6.12 6.40 103.2 2.9 Sr 407 0.005 0.2 0.31 71.8 4.09 1.27 81.2 2.7 Te 214 0.078 3.1 1.56 109.6 6.12 6.40 103.2 2.9 Sr 407 0.005 0.2 0.31 71.8 4.09 1.27 81.2 2.7 Te 214 0.078 3.1 1.56 109.6 7.49 6.40 97.3 3.8 Ti 334 0.050 2.0 0.78 101.0 9.46 3.18 92.4 5.5 Ti 190 0.092 3.7 1.56 110.3 4.04 6.40 101.9 2.0 V 292 0.028 1.1 0.78 108.3 3.94 3.18 102.5 2.6 W 207 0.075 3.0 1.56 74.9 11.0 68.69 19.1 101.0 9.6										
As 189 0.140 5.6 3.10 100.7 5.13 12.70 96.9 3.2 Ba 455 0.005 0.2 0.31 102.4 3.89 1.270 99.8 2.0 Be 313 0.005 0.2 0.31 106.8 3.53 1.270 102.8 2.1 Ca 317 0.908 36.3 15.6 68.1 12.66 64.00 96.8 5.3 Cd 226 0.0075 0.3 0.31 109.3 4.67 1.27 101.9 2.8 Co 228 0.012 0.5 0.31 109.4 5.31 1.27 102.8 2.8 Cr 267 0.020 0.8 0.31 109.4 5.31 1.27 102.8 2.8 Cr 267 0.020 0.8 0.31 109.4 5.31 1.27 103.4 4.1 Cu 324 0.068 2.7 1.56 104.9 5.18 6.40 101.8 2.4 Fe 259 0.095 3.8 1.56 88.7 46.82 6.40 99.1 9.7 K 766 1.73 69.3 23.4 96.4 4.70 95.00 99.2 2.2 La 408 0.048 1.9 0.78 45.5 4.19 3.18 98.8 2.6 Li 670 0.010 0.4 0.31 107.7 4.80 1.27 110.4 2.7 Mg 279 0.098 3.9 1.56 54.8 20.59 6.40 64.5 5.7 Mn 257 0.005 0.2 0.31 101.9 4.18 1.27 99.3 2.4 Mo 202 0.020 0.8 0.31 101.9 4.18 1.27 99.3 2.4 Mo 202 0.020 0.8 0.31 101.9 17.82 6.40 86.5 10.4 Pb 168 0.062 2.5 1.56 109.6 6.12 Sb 206 0.192 7.7 3.10 64.6 22.54 12.70 38.1 30.5 Se 196 0.135 5.4 2.30 83.1 26.23 9.50 76.0 17.2 Sn 189 0.040 1.6 0.78 85.7 27.29 3.18 52.0 29.4 Sr 407 0.005 0.2 0.31 71.8 4.09 1.27 81.2 2.7 Te 214 0.078 3.1 1.56 109.6 7.49 6.40 97.3 3.8 Ti 334 0.050 2.0 0.78 101.0 9.46 3.18 92.4 5.5 Ti 190 0.092 3.7 1.56 110.3 4.04 6.40 101.9 2.0 V 292 0.028 1.1 0.78 108.3 3.94 3.18 102.5 2.6 W 207 0.075 3.0 1.56 74.9 15.7 101.0 9.6										18.9
Ba 455 0.005 0.2 0.31 102.4 3.89 1.270 99.8 2.0 Be 313 0.005 0.2 0.31 106.8 3.53 1.270 102.8 2.1 Ca 317 0.908 36.3 15.6 68.1 12.66 64.00 96.8 5.3 Cd 228 0.012 0.5 0.31 105.2 5.57 1.27 101.9 2.8 Cr 267 0.020 0.8 0.31 109.3 4.67 1.27 102.8 2.8 Cr 267 0.020 0.8 0.31 109.4 5.31 1.27 103.4 4.1 Cu 324 0.068 2.7 1.56 104.9 5.18 6.40 101.8 2.4 Fe 259 0.095 3.8 1.56 88.7 46.82 6.40 99.1 9.7 K 766 1.73 69.3 23.4 45.5 <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>6.40</td><td>92.9</td><td>20.9</td></t<>								6.40	92.9	20.9
Be 313 0.005 0.2 0.31 106.8 3.53 1.270 102.8 2.1 Ca 317 0.908 36.3 15.6 68.1 12.66 64.00 96.8 5.3 Cd 226 0.0075 0.3 0.31 105.2 5.57 1.27 101.9 2.8 Co 228 0.012 0.5 0.31 109.3 4.67 1.27 101.9 2.8 Cr 267 0.020 0.8 0.31 109.4 5.31 1.27 102.8 2.8 Cu 324 0.068 2.7 1.56 104.9 5.18 6.40 101.8 2.4 Fe 259 0.095 3.8 1.56 88.7 46.82 6.40 101.8 2.4 Fe 259 0.095 3.8 1.56 88.7 46.82 6.40 99.1 9.7 K 766 1.73 69.3 23.4 96.4 <								12.70	96.9	3.2
Ca 317 0.908 36.3 15.6 68.1 12.66 64.00 96.8 5.3 Cd 226 0.0075 0.3 0.31 105.2 5.57 1.27 101.9 2.8 Co 228 0.012 0.5 0.31 109.3 4.67 1.27 102.8 2.8 Cr 267 0.020 0.8 0.31 109.3 4.67 1.27 102.8 2.8 Cr 267 0.020 0.8 0.31 109.4 5.31 1.27 102.8 2.8 Cr 267 0.020 0.8 0.31 109.4 5.31 1.27 102.8 2.8 Cu 324 0.068 2.7 1.56 104.9 5.18 6.40 101.8 2.4 Fe 259 0.095 3.8 1.56 88.7 46.82 6.40 99.1 9.7 K 766 1.73 69.3 23.4 96.4 <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td>3.89</td><td>1.270</td><td>99.8</td><td>2.0</td></t<>							3.89	1.270	99.8	2.0
Cd 226 0.0075 0.3 0.31 105.2 5.57 1.27 101.9 2.8 Co 228 0.012 0.5 0.31 109.3 4.67 1.27 102.8 2.8 Cr 267 0.020 0.8 0.31 109.4 5.31 1.27 103.4 4.1 Cu 324 0.068 2.7 1.56 104.9 5.18 6.40 101.8 2.4 Fe 259 0.095 3.8 1.56 88.7 46.82 6.40 99.1 9.7 K 766 1.73 69.3 23.4 96.4 4.70 95.00 99.2 2.2 La 408 0.048 1.9 0.78 45.5 4.19 3.18 98.8 2.6 Li 670 0.010 0.4 0.31 107.7 4.80 1.27 110.4 2.7 Mg 279 0.098 3.9 1.56 54.8 20						106.8	3.53	1.270	102.8	2.1
Co 228 0.012 0.5 0.31 109.3 4.67 1.27 102.8 2.8 Cr 267 0.020 0.8 0.31 109.4 5.31 1.27 103.4 4.1 Cu 324 0.068 2.7 1.56 104.9 5.18 6.40 101.8 2.4 Fe 259 0.095 3.8 1.56 88.7 46.82 6.40 99.1 9.7 K 766 1.73 69.3 23.4 96.4 4.70 95.00 99.2 2.2 La 408 0.048 1.9 0.78 45.5 4.19 3.18 98.8 2.6 Li 670 0.010 0.4 0.31 107.7 4.80 1.27 110.4 2.7 Mg 279 0.098 3.9 1.56 54.8 20.59 6.40 64.5 5.7 Mn 257 0.005 0.2 0.31 101.9 4.1						68.1	12.66	64.00	96.8	5.3
Cr 267 0.020 0.8 0.31 109.4 5.31 1.27 103.4 4.1 Cu 324 0.068 2.7 1.56 104.9 5.18 6.40 101.8 2.4 Fe 259 0.095 3.8 1.56 88.7 46.82 6.40 99.1 9.7 K 766 1.73 69.3 23.4 96.4 4.70 95.00 99.2 2.2 La 408 0.048 1.9 0.78 45.5 4.19 3.18 98.8 2.6 Li 670 0.010 0.4 0.31 107.7 4.80 1.27 110.4 2.7 Mg 279 0.098 3.9 1.56 54.8 20.59 6.40 64.5 5.7 Mn 257 0.005 0.2 0.31 101.9 4.18 1.27 99.3 2.4 Mo 202 0.020 0.8 0.31 110.6 5.82						105.2	5.57	1.27	101.9	2.8
Cu 324 0.068 2.7 1.56 104.9 5.18 6.40 101.8 2.4 Fe 259 0.095 3.8 1.56 88.7 46.82 6.40 99.1 9.7 K 766 1.73 69.3 23.4 96.4 4.70 95.00 99.2 2.2 La 408 0.048 1.9 0.78 45.5 4.19 3.18 98.8 2.6 Li 670 0.010 0.4 0.31 107.7 4.80 1.27 110.4 2.7 Mg 279 0.098 3.9 1.56 54.8 20.59 6.40 64.5 5.7 Mn 257 0.005 0.2 0.31 101.9 4.18 1.27 99.3 2.4 Mo 202 0.020 0.8 0.31 111.0 5.89 1.27 98.1 3.8 Ni 231 0.020 0.8 0.31 111.0 5.89<						109.3	4.67	1.27	102.8	2.8
Fe 259 0.095 3.8 1.56 88.7 46.82 6.40 99.1 9.7 K 766 1.73 69.3 23.4 96.4 4.70 95.00 99.2 2.2 La 408 0.048 1.9 0.78 45.5 4.19 3.18 98.8 2.6 Li 670 0.010 0.4 0.31 107.7 4.80 1.27 110.4 2.7 Mg 279 0.098 3.9 1.56 54.8 20.59 6.40 64.5 5.7 Mn 257 0.005 0.2 0.31 101.9 4.18 1.27 19.3 2.4 Mo 202 0.020 0.8 0.31 106.6 5.82 1.27 103.6 3.2 P 178 0.092 3.7 1.56 101.9 17.82 6.40 86.5 10.4 Pb 168 0.062 2.5 1.56 101.9 17.8					0.31	109.4	5.31	1.27	103.4	4.1
K 766 1.73 69.3 23.4 96.4 4.70 95.00 99.2 2.2 La 408 0.048 1.9 0.78 45.5 4.19 3.18 98.8 2.6 Li 670 0.010 0.4 0.31 107.7 4.80 1.27 110.4 2.7 Mg 279 0.098 3.9 1.56 54.8 20.59 6.40 64.5 5.7 Mn 257 0.005 0.2 0.31 101.9 4.18 1.27 99.3 2.4 Mo 202 0.020 0.8 0.31 106.6 5.82 1.27 99.3 2.4 Mo 202 0.020 0.8 0.31 111.0 5.89 1.27 103.6 3.2 P 178 0.092 3.7 1.56 101.9 17.82 6.40 86.5 10.4 Pb 168 0.062 2.5 1.56 109.6 6.12			0.068	2.7	1.56	104.9	5.18	6.40	101.8	2.4
La 408 0.048 1.9 0.78 45.5 4.19 3.18 98.8 2.6 Li 670 0.010 0.4 0.31 107.7 4.80 1.27 110.4 2.7 Mg 279 0.098 3.9 1.56 54.8 20.59 6.40 64.5 5.7 Mn 257 0.005 0.2 0.31 101.9 4.18 1.27 99.3 2.4 Mo 202 0.020 0.8 0.31 106.6 5.82 1.27 99.3 2.4 Mo 202 0.020 0.8 0.31 101.9 4.18 1.27 99.3 2.4 Mo 202 0.020 0.8 0.31 111.0 5.89 1.27 103.6 3.2 P 178 0.092 3.7 1.56 101.9 17.82 6.40 86.5 10.4 Pb 168 0.062 2.5 1.56 109.6 6.1			0.095	3.8	1.56	88.7	46.82	6.40	99.1	9.7
Li 670 0.010 0.4 0.31 107.7 4.80 1.27 110.4 2.7 Mg 279 0.098 3.9 1.56 54.8 20.59 6.40 64.5 5.7 Mn 257 0.005 0.2 0.31 101.9 4.18 1.27 99.3 2.4 Mo 202 0.020 0.8 0.31 106.6 5.82 1.27 98.1 3.8 Ni 231 0.020 0.8 0.31 111.0 5.89 1.27 103.6 3.2 P 178 0.092 3.7 1.56 101.9 17.82 6.40 86.5 10.4 Pb 168 0.062 2.5 1.56 109.6 6.12 6.40 103.2 2.9 Sb 206 0.192 7.7 3.10 64.6 22.54 12.70 38.1 30.5 Se 196 0.135 5.4 2.30 83.1 26.23 9.50 76.0 17.2 Sn 189 0.040 1.6 0.78 85.7 27.29 3.18 52.0 29.4 Sr 407 0.005 0.2 0.31 71.8 4.09 1.27 81.2 2.7 Te 214 0.078 3.1 1.56 109.6 7.49 6.40 97.3 3.8 Ti 334 0.050 2.0 0.78 101.0 9.46 3.18 92.4 5.5 Ti 190 0.092 3.7 1.56 110.3 4.04 6.40 101.9 2.0 V 292 0.028 1.1 0.78 108.3 3.94 3.18 102.5 2.6 W 207 0.075 3.0 1.56 74.9 15.79 6.40 44.7 19.6 Y 371 0.012 0.5 0.31 101.5 3.63 1.27 101.4 2.5 Zn 213 0.310 12.4 4.70 91.0 68.69 19.1 101.0 9.6				69.3	23.4	96.4	4.70	95.00	99.2	2.2
Mg 279 0.098 3.9 1.56 54.8 20.59 6.40 64.5 5.7 Mn 257 0.005 0.2 0.31 101.9 4.18 1.27 99.3 2.4 Mo 202 0.020 0.8 0.31 106.6 5.82 1.27 98.1 3.8 Ni 231 0.020 0.8 0.31 111.0 5.89 1.27 103.6 3.2 P 178 0.092 3.7 1.56 101.9 17.82 6.40 86.5 10.4 Pb 168 0.062 2.5 1.56 109.6 6.12 6.40 103.2 2.9 Sb 206 0.192 7.7 3.10 64.6 22.54 12.70 38.1 30.5 Se 196 0.135 5.4 2.30 83.1 26.23 9.50 76.0 17.2 Sn 189 0.040 1.6 0.78 85.7			1	1.9	0.78	45.5	4.19	3.18	98.8	2.6
Mn 257 0.005 0.2 0.31 101.9 4.18 1.27 99.3 2.4 Mo 202 0.020 0.8 0.31 106.6 5.82 1.27 98.1 3.8 Ni 231 0.020 0.8 0.31 111.0 5.89 1.27 103.6 3.2 P 178 0.092 3.7 1.56 101.9 17.82 6.40 86.5 10.4 Pb 168 0.062 2.5 1.56 109.6 6.12 6.40 103.2 2.9 Sb 206 0.192 7.7 3.10 64.6 22.54 12.70 38.1 30.5 Se 196 0.135 5.4 2.30 83.1 26.23 9.50 76.0 17.2 Sn 189 0.040 1.6 0.78 85.7 27.29 3.18 52.0 29.4 Sr 407 0.005 0.2 0.31 71.8 <td< td=""><td></td><td></td><td>0.010</td><td></td><td>0.31</td><td>107.7</td><td>4.80</td><td>1.27</td><td>110.4</td><td>2.7</td></td<>			0.010		0.31	107.7	4.80	1.27	110.4	2.7
Mn 257 0.005 0.2 0.31 101.9 4.18 1.27 99.3 2.4 Mo 202 0.020 0.8 0.31 106.6 5.82 1.27 98.1 3.8 Ni 231 0.020 0.8 0.31 111.0 5.89 1.27 103.6 3.2 P 178 0.092 3.7 1.56 101.9 17.82 6.40 86.5 10.4 Pb 168 0.062 2.5 1.56 109.6 6.12 6.40 103.2 2.9 Sb 206 0.192 7.7 3.10 64.6 22.54 12.70 38.1 30.5 Se 196 0.135 5.4 2.30 83.1 26.23 9.50 76.0 17.2 Sn 189 0.040 1.6 0.78 85.7 27.29 3.18 52.0 29.4 Sr 407 0.005 0.2 0.31 71.8 <td< td=""><td>Мg</td><td></td><td>0.098</td><td>3.9</td><td>1.56</td><td>54.8</td><td>20.59</td><td>6.40</td><td>64.5</td><td>5.7</td></td<>	Мg		0.098	3.9	1.56	54.8	20.59	6.40	64.5	5.7
Ni 231 0.020 0.8 0.31 111.0 5.89 1.27 103.6 3.2 P 178 0.092 3.7 1.56 101.9 17.82 6.40 86.5 10.4 Pb 168 0.062 2.5 1.56 109.6 6.12 6.40 103.2 2.9 Sb 206 0.192 7.7 3.10 64.6 22.54 12.70 38.1 30.5 Se 196 0.135 5.4 2.30 83.1 26.23 9.50 76.0 17.2 Sn 189 0.040 1.6 0.78 85.7 27.29 3.18 52.0 29.4 Sr 407 0.005 0.2 0.31 71.8 4.09 1.27 81.2 2.7 Te 214 0.078 3.1 1.56 109.6 7.49 6.40 97.3 3.8 Ti 334 0.050 2.0 0.78 101.0 9.46 3.18 92.4 5.5 Ti 190 0.092 3.7 1.56 110.3 4.04 6.40 101.9 2.0 V 292 0.028 1.1 0.78 108.3 3.94 3.18 102.5 2.6 W 207 0.075 3.0 1.56 74.9 15.79 6.40 44.7 19.6 Y 371 0.012 0.5 0.31 101.5 3.63 1.27 101.4 2.5 Zn 213 0.310 12.4 4.70 91.0 68.69 19.1 101.0 9.6			0.005	0.2	0.31	101.9	4.18	1.27	99.3	2.4
Ni 231 0.020 0.8 0.31 111.0 5.89 1.27 103.6 3.2 P 178 0.092 3.7 1.56 101.9 17.82 6.40 86.5 10.4 Pb 168 0.062 2.5 1.56 109.6 6.12 6.40 103.2 2.9 Sb 206 0.192 7.7 3.10 64.6 22.54 12.70 38.1 30.5 Se 196 0.135 5.4 2.30 83.1 26.23 9.50 76.0 17.2 Sn 189 0.040 1.6 0.78 85.7 27.29 3.18 52.0 29.4 Sr 407 0.005 0.2 0.31 71.8 4.09 1.27 81.2 2.7 Te 214 0.078 3.1 1.56 109.6 7.49 6.40 97.3 3.8 Ti 190 0.092 3.7 1.56 110.3 <td< td=""><td></td><td></td><td>0.020</td><td>8.0</td><td>0.31</td><td>106.6</td><td>5.82</td><td>1.27</td><td>98.1</td><td>3.8</td></td<>			0.020	8.0	0.31	106.6	5.82	1.27	98.1	3.8
P 178 0.092 3.7 1.56 101.9 17.82 6.40 86.5 10.4 Pb 168 0.062 2.5 1.56 109.6 6.12 6.40 103.2 2.9 Sb 206 0.192 7.7 3.10 64.6 22.54 12.70 38.1 30.5 Se 196 0.135 5.4 2.30 83.1 26.23 9.50 76.0 17.2 Sn 189 0.040 1.6 0.78 85.7 27.29 3.18 52.0 29.4 Sr 407 0.005 0.2 0.31 71.8 4.09 1.27 81.2 2.7 Te 214 0.078 3.1 1.56 109.6 7.49 6.40 97.3 3.8 Ti 190 0.092 3.7 1.56 110.3 4.04 6.40 101.9 2.0 V 292 0.028 1.1 0.78 108.3			0.020	0.8	0.31	111.0	5.89	1.27	103.6	
Pb 168 0.062 2.5 1.56 109.6 6.12 6.40 103.2 2.9 Sb 206 0.192 7.7 3.10 64.6 22.54 12.70 38.1 30.5 Se 196 0.135 5.4 2.30 83.1 26.23 9.50 76.0 17.2 Sn 189 0.040 1.6 0.78 85.7 27.29 3.18 52.0 29.4 Sr 407 0.005 0.2 0.31 71.8 4.09 1.27 81.2 2.7 Te 214 0.078 3.1 1.56 109.6 7.49 6.40 97.3 3.8 Ti 334 0.050 2.0 0.78 101.0 9.46 3.18 92.4 5.5 TI 190 0.092 3.7 1.56 110.3 4.04 6.40 101.9 2.0 V 292 0.028 1.1 0.78 108.3 3			0.092	3.7	1.56	101.9	17.82	6.40	86.5	
Sb 206 0.192 7.7 3.10 64.6 22.54 12.70 38.1 30.5 Se 196 0.135 5.4 2.30 83.1 26.23 9.50 76.0 17.2 Sn 189 0.040 1.6 0.78 85.7 27.29 3.18 52.0 29.4 Sr 407 0.005 0.2 0.31 71.8 4.09 1.27 81.2 2.7 Te 214 0.078 3.1 1.56 109.6 7.49 6.40 97.3 3.8 Ti 334 0.050 2.0 0.78 101.0 9.46 3.18 92.4 5.5 Ti 190 0.092 3.7 1.56 110.3 4.04 6.40 101.9 2.0 V 292 0.028 1.1 0.78 108.3 3.94 3.18 102.5 2.6 W 207 0.075 3.0 1.56 74.9 15.				2.5	1.56	109.6	6.12	6.40		
Se 196 0.135 5.4 2.30 83.1 26.23 9.50 76.0 17.2 Sn 189 0.040 1.6 0.78 85.7 27.29 3.18 52.0 29.4 Sr 407 0.005 0.2 0.31 71.8 4.09 1.27 81.2 2.7 Te 214 0.078 3.1 1.56 109.6 7.49 6.40 97.3 3.8 Ti 334 0.050 2.0 0.78 101.0 9.46 3.18 92.4 5.5 Ti 190 0.092 3.7 1.56 110.3 4.04 6.40 101.9 2.0 V 292 0.028 1.1 0.78 108.3 3.94 3.18 102.5 2.6 W 207 0.075 3.0 1.56 74.9 15.79 6.40 44.7 19.6 Y 371 0.012 0.5 0.31 101.5 3.63	Sb		0.192	7.7	3.10	64.6	22.54	12.70	38.1	
Sr 407 0.005 0.2 0.31 71.8 4.09 1.27 81.2 2.7 Te 214 0.078 3.1 1.56 109.6 7.49 6.40 97.3 3.8 Ti 334 0.050 2.0 0.78 101.0 9.46 3.18 92.4 5.5 Ti 190 0.092 3.7 1.56 110.3 4.04 6.40 101.9 2.0 V 292 0.028 1.1 0.78 108.3 3.94 3.18 102.5 2.6 W 207 0.075 3.0 1.56 74.9 15.79 6.40 44.7 19.6 Y 371 0.012 0.5 0.31 101.5 3.63 1.27 101.4 2.5 Zn 213 0.310 12.4 4.70 91.0 68.69 19.1 101.0 9.6		196	0.135	5.4	2.30	83.1	26.23	9.50	76.0	17.2
Sr 407 0.005 0.2 0.31 71.8 4.09 1.27 81.2 2.7 Te 214 0.078 3.1 1.56 109.6 7.49 6.40 97.3 3.8 Ti 334 0.050 2.0 0.78 101.0 9.46 3.18 92.4 5.5 Ti 190 0.092 3.7 1.56 110.3 4.04 6.40 101.9 2.0 V 292 0.028 1.1 0.78 108.3 3.94 3.18 102.5 2.6 W 207 0.075 3.0 1.56 74.9 15.79 6.40 44.7 19.6 Y 371 0.012 0.5 0.31 101.5 3.63 1.27 101.4 2.5 Zn 213 0.310 12.4 4.70 91.0 68.69 19.1 101.0 9.6			0.040	1.6	0.78	85.7	27.29	3.18	52.0	29.4
Ti 334 0.050 2.0 0.78 101.0 9.46 3.18 92.4 5.5 Ti 190 0.092 3.7 1.56 110.3 4.04 6.40 101.9 2.0 V 292 0.028 1.1 0.78 108.3 3.94 3.18 102.5 2.6 W 207 0.075 3.0 1.56 74.9 15.79 6.40 44.7 19.6 Y 371 0.012 0.5 0.31 101.5 3.63 1.27 101.4 2.5 Zn 213 0.310 12.4 4.70 91.0 68.69 19.1 101.0 9.6			0.005	0.2	0.31	71.8	4.09	1.27	81.2	
Ti 334 0.050 2.0 0.78 101.0 9.46 3.18 92.4 5.5 TI 190 0.092 3.7 1.56 110.3 4.04 6.40 101.9 2.0 V 292 0.028 1.1 0.78 108.3 3.94 3.18 102.5 2.6 W 207 0.075 3.0 1.56 74.9 15.79 6.40 44.7 19.6 Y 371 0.012 0.5 0.31 101.5 3.63 1.27 101.4 2.5 Zn 213 0.310 12.4 4.70 91.0 68.69 19.1 101.0 9.6			0.078	3.1	1.56	109.6	7.49	6.40	97.3	3.8
TI 190 0.092 3.7 1.56 110.3 4.04 6.40 101.9 2.0 V 292 0.028 1.1 0.78 108.3 3.94 3.18 102.5 2.6 W 207 0.075 3.0 1.56 74.9 15.79 6.40 44.7 19.6 Y 371 0.012 0.5 0.31 101.5 3.63 1.27 101.4 2.5 Zn 213 0.310 12.4 4.70 91.0 68.69 19.1 101.0 9.6	Ti	334	0.050	2.0	0.78	101.0	9.46	3.18	92.4	
V 292 0.028 1.1 0.78 108.3 3.94 3.18 102.5 2.6 W 207 0.075 3.0 1.56 74.9 15.79 6.40 44.7 19.6 Y 371 0.012 0.5 0.31 101.5 3.63 1.27 101.4 2.5 Zn 213 0.310 12.4 4.70 91.0 68.69 19.1 101.0 9.6		190	0.092	3.7	1.56	110.3	4.04	6.40		
W 207 0.075 3.0 1.56 74.9 15.79 6.40 44.7 19.6 Y 371 0.012 0.5 0.31 101.5 3.63 1.27 101.4 2.5 Zn 213 0.310 12.4 4.70 91.0 68.69 19.1 101.0 9.6	٧	292	0.028	1.1	0.78	108.3	3.94	3.18		
Y 371 0.012 0.5 0.31 101.5 3.63 1.27 101.4 2.5 Zn 213 0.310 12.4 4.70 91.0 68.69 19.1 101.0 9.6	W	207	0.075	3.0	1.56	74.9	15.79	6.40		
Zn 213 0.310 12.4 4.70 91.0 68.69 19.1 101.0 9.6	Υ	371	0.012	0.5	0.31	101.5	3.63			
	Zn	213	0.310	12.4	4.70	91.0				
	Zr	339	0.022	0.9	0.31	70.7	54.20	1.27	40.4	42.1

⁽a) Values reported were obtained with a Spectro Analytical Instruments EOP ICP; performance may vary with instrument and should be independently verified.

⁽b) Values are certified by Inorganic Ventures INC. at 3x and 10x the approximate instrumental LOD [12].

⁽c) Bold values are qualitative only because of low recovery. Other digestion techniques may be more appropriate for these elements and their compounds.

4.2 EXCAVATION/TRENCHING OPERATIONS – SOIL LOADING OPERATIONS SAFE WORK PRACTICES

- No person, under any circumstance, will be permitted to enter an excavation >4-feet in depth.
 Personnel must use remote sampling techniques to collect samples from excavations or collect the samples from the excavator bucket in these circumstances.
- Personnel must not lean over excavations of >5-feet deep unless side walls are supported, benched, or sloped.
- Personnel will make every attempt to position themselves upwind from excavations at all times.
- Personnel must stand away from the reach of the excavator, (blind spot and swing pattern of the excavator).
- All open excavations must properly be barricaded. This is especially critical during periods when the site
 is left unattended.

Heavy Equipment Maintenance and Operation

- Heavy equipment operation will be evaluated by the SSO in accordance with 29 CFR 1926 Subpart O.
- Heavy equipment will be operated in a safe manner, so that the equipment will be kept from rolling over or sliding into an excavation.
- Dump vehicles will be level before the bed is raised. Dump beds will be smooth to prevent loads sticking at the front (top) of the bed. Stand away from either side of the dump vehicle while the bed is being raised or lowered as there is always a possibility that the vehicle will roll on its side.
- All cab glass will be kept clean and will not impair the safe operation of the equipment.
- All equipment will be operated at least 20 feet from overhead power lines and other electrical equipment unless otherwise permitted by 29 CFR 1926.550 (a)(15).
- Equipment which has an obstructed view to the rear must be equipped with an audible reverse (backup) alarm.

- Personnel in site vehicles will sound the Horn before backing to alert nearby pedestrians.
- Haulage vehicles with cabs will be equipped with a cab shield or canopy to protect the operator from falling loads during loading.
- All equipment must be equipped with seat belts except those which do not have roll-over protective structures. When seat belts are provided, they must be used.
- All mechanized equipment on the job site will be inspected at the beginning of each shift. This inspection will include checking the following parts, equipment and accessories to ensure they are in safe operating condition and free of apparent damage that could cause failure while in use: service brakes, including trailer brake connections; parking system (hand brake); tires; horn; steering mechanism; coupling devices; seat belts; operating controls; and safety devices. All defects shall be corrected before the vehicle is placed into service.
- Equipment operators will wear hearing protection unless the owner of the equipment can demonstrate
 that noise exposures in side the cab will not exceed the OSHA Permissible Exposure Limit.
- Persons handling potentially-contaminated soils/debris will be required to satisfy all medical and training requirements listed in this plan.
- While trucks and/or containers are being loaded with potentially-contaminates soils/debris, the persons
 who are responsible for the equipment being loaded will stand in the support zone away from the
 loading operation at all times or remain in the closed cab, unless they satisfy the training and medical
 requirements of this plan. Loading operations will not begin until such persons are positioned a safe
 distance away.
- Truck beds and/or containers used to haul potentially-contaminated soils/debris will be loaded in a manner that minimizes and controls spillage. Once loaded, the containers will be adequately covered to prevent dust emissions during transport.

Figure 4-6 Heavy	Equipment	Inspection	Checklist
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Com	ıpany:		Unit/Serial No	o#:
			/	ype:pment - tractors backhoes, bulldozer)
Yes	No	l NA		
			Seat Belts • Are available for intended operator and passengers (where applicable) • Seat Belts are operational?	Comments
			 Roll-Over Protection Roll-over protection structures (ROPS) are provided on vehicles and heavy equipment (including scrapers, tractors, loaders, bulldozers, carryalls, etc.) 	
			Brake systems capable of stopping and holding fully loaded equipment Parking Brake functions properly Wheel Chocks available (where and as applicable)	
			Access Non-slip steps Grab Handles (3-Point Grab/Step Mounting Points)	
			 Audible Alarms Audible alarms – All bi-directional machines, such as rollers, compacters, front-end loaders, bulldozers, and similar equipment, shall be equipped with a horn, distinguishable from the surrounding noise level, which shall be operated as needed when the machine is moving in either direction. Back up Alarms – All self propelled equipment with an obstructed view to the rear will be equipped with a reverse gear signal alarm distinguishable from the surrounding noise level. 	
			Horn functioning properly?	

Figure 4-6	Heavy	Equipment	Inspection	Checklist
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Com	pany:		Unit/Serial No#:
			I Time: : Equipment Type: (e.g, earthmoving equipment - tractors backhoes, bulldozer) Project No#:
Yes	No	NA	Requirements Comments
			Fenders for equipment that can exceed 15mph Fire Extinguisher Are exhaust emissions directed away from the Operator? Cab Clean, free from debris, tools or equipment that can interfere with foot control. Free from storage of flammable material/solvents Mirrors, Safety glass Equipped with defrosters Windshield wipers Turn signals, lights, brake lights, etc. (front/rear) for equipment approved for highway use? Gauges functioning properly Tires (tread) or tracks Steering (standard and emergency) Are tools and material secured to prevent movement during transport?
			Fluid Levels: • Engine oil • Transmission fluid • Brake fluid • Cooling system fluid • Hoses and belts • Hydraulic oil

Figure 4-6 Heavy Equipment Inspection Checklist					
Company:	Unit/Serial No#:				
Inspection Date:/ Time::	Equipment Type:				
Project Name:	(e.g, earthmoving equipment - tractors backhoes, bulldozer) Project No#:				

Yes	No	NA	Requirements Comments
			 Fueling Fueling of vehicles and heavy equipment is done with the engine off. No smoking is permitted at or near the fuel storage or refueling
			 area. A sign is posted stating: NO SMOKING WITHIN 50 FEET. No sources of ignition are present near the fuel storage or refueling
			 area. A dry chemical or carbon dioxide fire extinguisher (rated 6:BC or larger) is in a location accessible to the fueling area, no closer than
			50-feet. • Safety cans available?
			 Safety Guards – Around rotating apparatus (belts, pulleys, sprockets, spindles, drums, flywheels, chains) all points of operations protected from
			 accidental contact? Adjusted correctly? Hot pipes and surfaces are protected from accidental contact? High pressure pneumatic lines have safety cable to prevent thrashing should it become disconnected?
			Have the attachments designed for use (as per manufacturer's recommendation) with this equipment been inspected and are considered suitable for use?
			Operator Qualifications Does the operator have proper licensing where applicable, (e.g., CDL)?
			Does the operator, understand the equipment's operating instructions?
			 Is the operator experienced with this equipment? Is the operator 21 years of age or more?

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Site Health and Safety Officer

	Figure 4-6 Heavy Equipment Inspec	tion Checklist
Company:		Unit/Serial No#:
	te:/	Equipment Type:
Yes No N		Comments
	PPE Required	
	Key(s)? Operating Manual?	
	Other Hazards • Excessive Noise Levels	
Approved for U	Use 🗌 Yes 🔠 No 🔲 See Comments	I among the second seco

Operator

FIGURE 4-7

LOAD INSPECTION REPORT

Complete this Attachment whenever bulk shipments (Dump trucks, roll-off containers, etc.) are transported over public thoroughfares/highways. Waste Stream: Facility Disposal No.: _____ Cum Load No.: (by waste stream) Trucking Company:_____ Date: Truck No.: ______ Permit No.:_____ License Plate No.: ______ Permit No.:____ Is truck certified to transport hazardous and/or non-hazardous waste in Rhode Island? Drivers Name (Print):_____ Drivers Signature: Applicable State CDL Driver Certificate No.:_____ Driver Physically fit to Drive? Driver has documentation of H&S Training (DOT HM-181):_____ CDL Designations:____ Is the drivers log book current?: Is a valid certificate of insurance in force?: Manifest No.: _____Bill of Lading No.:___ Manifest complete and accurate?: Are proper DOT approved shipping containers being used?_____ Is labeling in accordance with 40 CFR?:_____ Overall condition of trailer of shipping containers: Is Truck properly lined (plastic) and tarped?_____ Is Tailgate Seal in good condition? _____ Tailgate turn buckles being used?:____ Is trailer or containers leaking? Inspector Signature:___ Additional comments: The following represent common weights of materials for estimating load capacity when portable or fixed scales are not available. Material Weight lbs/ft3 Weight lbs/yd3 Earth (Wet) ~100 2700 Earth (Dry loam) ~78 2106 Sand (wet) ~130 3240 Concrete (Limestone Aggregate) ~148 3996 Steel (Cast) ~490 13,230

Water

Steel (Rolled)

~495

62.4

13,365

1684.8

FIGURE 4-8 TETRA TECH NUS, INC. AIR SAMPLE LOG SHEET

Project	Name:				···	Project N	umber:	
Sample Date:/								
Instrum	ent Type:							
Analytic	al Method No	o.:			Ar	nalytical Te	echnique:_	
Sample	Media:			(Tubes)_		····		(Cassettes)
Average	Flow Rate				A۱	erage Flo	w Rate	
Before S	Sampling: _		//	min.	Af	ter Sampli	ng:	l/mir
Average	Flow Rate o	ver Sampling	Period: _					l/mir
Pump S	tatus Checke	ed at:		**************************************		···		
Sample	Type: (TWA))		···	(ST	EL)		
Time Or	า:	_Time Off:	Ţ	otal Time:		Air Volur	ne Sample	ed:liters
Worker	or Area Sam	pled:		W-111-11		s	ocial Secu	rity No.:
Job Des	cription:		***************************************		· · · · · · · · · · · · · · · · · · ·			
·····		ansportation_		w <u></u>				(Circle One)
Calibrato	or Type:	ELE	CTRONIC	OST PUMI C PRIMAR erial Number	Y FLOW	/ CALIBI	RATION	ibration Date:
Date	Media ———	Flow Cell Volume	Flow Rate 1	Flow Rate 2	Flov Rate		Avg. Flow	Initials.
				POST PUME				
Date	Media	(ml) Volume	Time 1	Time 2 ——	Time 3	Avg. Time	Avg. Flow	Initials
 112G0082	5	·-		4-40		***************************************		CTO 0405

TABLE 4-2 ACTIVITY HAZARD ANALYSIS

ACTIVITY: Decontamination activities

ANALYZED BY/DATE: Tom Dickson 05/2007

ACTIVITY / PHASE	POTENTIAL HAZARDS	RECOMMENDED ACTIONS / CONTROLS		
This activity hazard analysis will address decontamination procedures for personal and heavy equipment	Contaminant exposure	The SSHO will set up tub(s) at within the boundaries of the operating grid location, that will provide for soap and water wash and rinse of hands and face as well as a boot wash to be used when exiting the contaminated area.		
decontamination. Procedural steps: Personal Decontamination • Secure all equipment. This means shutting down heavy equipment; washing	2. Slips, Trips, Falls	2. Practice good housekeeping to keep the site clear of obstructions, materials, equipment and other tripping hazards. Wear appropriate foot protection to prevent slips and trips. Use caution when working on uneven and wet ground surfaces. A six foot step ladder will be provided for entering and exiting the excavated grids >2-feet in depth or they will be sloped in a designated area so persons do not have to crawl on the ground to exit.		
off hand tools, etc. • Segregated removal of PPE (wash and rinse reusable items, dispose of non-reusable items) working top down outside in.	3. Exposure to contaminated media	 3. Follow good decontamination practices. Procedures are as follows: 1st. A HEPA Vac will be used to remove potentially contaminated dust from work clothes, PPE, and footwear, hair, etc Work from the top down. 2nd. Use soap and water to wash reusable and dedicated PPE items 3rd. Hard hats and safety glasses will be vacuumed or rinsed to remove residual dust. 4th. Over boots will be washed and can be left on exiting the Contamination Reduction Zone. 5th. Disposable surgeons gloves will be washed with soap and water, then removed and disposed of as general refuse. 6th. Reusable gloves such as leather work gloves will be vacuumed to remove residual dust. 7th. Gloves will be the last item of PPE removed. Wash hands and face following personal decontamination and prior to performing any hand-to-mouth activity. For incidental contact such as experience by the operators and samplers, the use of hygienic wipes such as D-Lead can be used. D-Lead is specifically 		
Decontamination of heavy	1. Noise	designed for removal of heavy metals. 1. Pressure washer operator must wear hearing protection (muffs or plugs with		
equipment and large tooling (e.g., excavators, vehicles,		NRR of at least 25 dB)		
etc.) using pressure washer	Flying projectiles	Restrict other personnel from decon pad during pressure washing operations. Pressure washer operator must exercise care when directing the		

TABLE 4-2 ACTIVITY HAZARD ANALYSIS

ACTIVITY: Decontamination activities

ANALYZED BY/DATE: Tom Dickson 05/2007

ACTIVITY / PHASE	POTENTIAL HAZARDS	RECOMMENDED ACTIONS / CONTROLS
	 3. Falling objects 4. Strains/sprains from heavy lifting 5. Slips/trips/falls 6. Exposure to contaminated media 	 wand so that it is not pointing at himself/herself or at any other worker. Pressure washer operator must wear safety glasses with side shields and face shield. Pressure washers >3000psi will be equipped with a minimum 15° deflection tip. For pressure washers under 2500psi operators will follow the manufacturer's operation procedures. 3. Place items to be decontaminated on a pallet on ground or on washing/drying racks in a manner that they are secure and will not fall. Wear steel toe safety footwear with chemical resistant boot covers. 4. Practice safe lifting techniques (use mechanical lifting devices such as a dolly whenever possible, ensure clear path of travel, good grasp on object, lift with legs not back, obtain help when needed to lift large, bulky, or heavy items). 5. Keep decon areas orderly, maintain good housekeeping, collect sands and sediments that builds within the decontamination pad. 6. Follow good decontamination practices (work from top down and outside in). Surgeon's gloves are to be the last item of PPE removed. Wash hands and face following personal decontamination and prior to performing any hand-to-mouth activity. Periodically, flush the pump and line to the storage tank with clean water as sediments tend to build up and affect the operating efficiency.
EQUIPMENT TO BE USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
Hand tools (hand brushes, garden sprayers, hoses, etc.) Pressure washer at least 2500 psi		All personnel participating in this activity must be current with HAZWOPER training requirements as specified in Mobilization/Demobilization.
	deficiencies report to the SSHO.	

TABLE 4-2 ACTIVITY HAZARD ANALYSIS

ACTIVITY: Decontamination activities

ANALYZED BY/DATE: Tom Dickson 05/2007

ACTIVITY / PHASE	POTENTIAL HAZARDS	RECOMMENDED ACTIONS / CONTROLS		
Personal Protective Equipment: Minimum:	Initial PPE inspection performed by SSHO. Ongoing	PPE training in proper use, care, storage, and limitations. It is anticipated that this has been covered in employees 40 hour HAZWOPER training, which is to be		
See Below.	(prior to each use) inspections responsibilities of PPE users.	verified by the SSHO through initial training documentation and review prior to permitting personnel to participate in site activities, and will be confirmed by visual observations of worker activities.		
Decontamination pad pressure washer operators are to wear Safety impact eye protection with side shields, face shield Hearing protection Nitrile gloves. Rain suit or moisture-repellant disposable coveralls Impermeable overboots		Pressure Washer operation and maintenance requirements.		
Optional items: Impermeable apron may be used when condition of heat stress are prevalent, when specified by the SSHO.				

SECTION 5.0 REMEDIATION DERIVED WASTE MANAGEMENT SAFE WORK PACKET

SECTION 5.0

5.1 ACTIVITY AND DOCUMENTATION CHECKLIST

The Saf	The Safe Work Packet for Remediation Derived Waste (RDW) Management activities on the Melville				
Water T	Water Tower Site located in Portsmouth, RI				
The Sat	fe Work Packet for this activity contains the following information				
	Table 5-1 Remediation Derived Waste (RDW) Management Activity Hazard Analysis.				
	Figure 5-1 Remediation Derive Waste Drum/Container Inventory Log.				

d Remember:

 All personnel must complete the Mobilization/Demobilization Safe Work Packet and review the Emergency Action Plan in addition to Task Specific Safe Work Packets. **ACTIVITY:**

RDW Management

ANALYZED BY/DATE: Tom Dickson 05/2007

112G00825

ACTIVITY / PHASE	POTENTIAL HAZARDS	RECOMMENDED ACTIONS / CONTROLS			
Staging Drums and Smaller containers The following RDW is anti-in-stad in a state of the state	1) Lifting	1) Lifting (strain/muscle pulls) - Where possible, use mechanical means (i.e. dollies, heavy equipment) to move and drums and handle smaller containers. Use proper lifting techniques described in Section 4.4 of the Health and Safety Guidance Manual (HSGM).			
 anticipated in support of this project Disposable PPE General Refuse (Boxes, paper, etc.) Decontamination waters 	2) Pinches and compressions	2) Pinches and compressions – If drums are handled as part of this activity the following will apply. During placement of drums/containers on pallets use machinery or assistance from another person, where possible. Keeps hand out of the area between drums. NOTE: TtNUS personnel are not authorized to operate forklifts or other motorized,			
and solids Disposable PPE and general refuse can be thrown away as trash in the dumpster provided for this activity.		industrial trucks unless they have been properly trained. Reminder: The drums you are attempting to move, lift and/or relocate may weigh on the average of - 55-Gallon container of purge or decontamination waters = 475 lbs. (including the container)			
RDW is anticipated to include Bulk containers Drums (UN 1A2) Bag and dumpster		- 55-Gallon container of soils (moist) = 750 lbs. (including the container) To further reduce material handling hazards, support spill containment and control, and sampling when necessary, the IDW storage area should be structured as follows:			
(General Refuse) RDW Management, activities will include: Containerizing decontamination waters through pumps or direct		 Maximum 4-drums to a pallet with retaining ring bolt and label on the outside for easy access/reference. Maintain a minimum of 4-feet between each row of pallets. This is the minimum distance necessary to wheel drums on a drum dolley. If the site is not secured, the satellite storage area shall be fenced and signs placed indicating the following: a. Primary Point of Contact (Make sure they know they been identified as the Primary Point of Contact). 			
 fill methods Staging and Labeling Containers, where appropriate. 		b. Phone Number c. Emergency Contact (If different from the Primary) - Provide a Drum/Container Inventory to the Primary Point of Contact and to			
It is anticipated that very little RDW will be generated in closing out the final		Emergency Services, if they deem it necessary. The inventory should contain: a. Each drum shall be assigned a unique identification number. This number shall be placed on the label and drum shell using a paint marker (Note: Do not paint the number on the lid as these have a tendency to get exchanged			

ACTIVITY:

RDW Management

ANALYZED BY/DATE: Tom Dickson 05/2007

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112G00825	ACTIVITY / PHASE	POTENTIAL HAZARDS	RECOMMENDED ACTIONS / CONTROLS
.	decontamination activities.		from time to time.) b. Types of waste materials (purge/development waters, etc.) c. Volumes (Full or level associated with the container after completion of the project location) d. Dates (For all filled containers and at the completion of work for that area) e. Contact – For more information Ensure all lids are secured.
		3) Slips/Trips/Falls	 3) Slips, trips, and falls Remove/identify trip hazards from the work area. This is critical when moving containers that weigh this much. Maintain good housekeeping within the work area.
5-3	Bulk Container	4) Slips trips and falls	 4) Slips trips and falls – Hoses often become a tripping hazard when they are employed to pump decon fluids from one location to another. Slippery steps associated with frac tanks are also another area where this hazard maybe recognized. Ensure all three point mounting appliances are in good shape. Non-slip treads are provided. Secure hoses or hard plumb piping into larger storage tanks. Ensure hand rails are provided on top. (If handrails are not provided contact the PHSO regarding the use of fall protection).
		5) Spills – Chemical Contamination	 5) Spills - Chemical Contamination Check all hose connections. Insure all are equipped with seals/gaskets and do not leak. If they do leak replace as necessary. Flush the lines after pumping to the bulk container with clean water to flush the pump and transfer lines.
CTO 0405		6) Equipment – Power Management Hazards	 6) Equipment – Power Management Hazards Inspect all power equipment using the attached equipment inspection form to insure operating integrity. Never operate an internal combustion engine inside an enclosure. An electric generator and/or pump needs a minimum of 3 to 4 feet of spacing on all sides (including the top). A generator needs an unlimited supply of fresh air for proper cooling during operation. Properly locate the generator/pump outdoors away from doors and windows to supporting functions such as office trailers.

Revision 0 June 2007

RDW Management

ANALYZED BY/DATE: Tom Dickson 05/2007

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ACTIVITY / PHASE	POTENTIAL HAZARDS	RECOMMENDED ACTIONS / CONTROLS		
	 Keep the generator dry and always operate it on a level surface. Never add fuel to your generator/pump when it is running and always store additional fuel in approved Gasoline containers. Examine extension cords to insure they are free of obvious damage (nicks, cuts plugs are damaged, etc.). Do not attempt to over ride the Ground Fault Circuit Interrupter or tamper. If the plug trips it is for a reason (overloading, fault to ground, etc.) 			
	7) Noise	7) Noise Pump operation will be gas powered or powered by a generator. In either case, if you are working within this area (25-feet of this power source) for an extended period of time, it is recommended that hearing protection be employed.		

Spill Containment - Within this scope of work there is only one activity identified as vulnerable to potential spills. This includes the containers of decontamination wash waters.

Prevention:

- Inspect all containers for damage or areas vulnerable to release.
- Place the RDW storage area within an area should a breach occur that it will drain into grids that have been excavated or will be excavated (Containment Area). Avoid staging near stormwater conveyances where possible, if not, provide control mechanisms in this area.

This section describes the procedures the Tetra Tech NUS field personnel will employ upon the detection of a spill or leak.

- Notify the SSHO or FOL immediately upon detection of a leak or spill. Initiate incidental response measures, remove non-essential personnel.
- Employ the personal protective equipment stored at the staging area. Take immediate actions to stop the leak or spill by plugging or patching the container or raising the leak to the highest point in the vessel. Spread the absorbent material in the area of the spill, covering it completely.
- Transfer the material to a new vessel; collect and containerize the absorbent material. Label the new container appropriately. Await analyses for treatment and disposal options.
- Re-containerize spills, including 2-inch of top cover (if over soils) impacted by the spill. Await test results for treatment or disposal options.
- Personal Protective Equipment required for Spill Response:
 - Nitrile outer gloves
 - Splash Shield
 - Impermeable over-boots
 - Rain suits

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ACTIVITY: RDW Management	ANALYZED BY/DATE: Tom Di	ANALYZED BY/DATE: Tom Dickson 05/2007			
None –Visual observation of work practices by the FOL and/or the SSHO to minimize potential physical hazards (i.e., improper lifting, unsecured loads, etc.). Air monitoring will only be employed if Spill Containment is implemented.	Decontamination Procedures: Not required, unless spill containment protocol is implemented. Then the following will apply Once the spill is secured and all of the spill equipment has been through a soap and water wash and rinse. Personnel will wash/rinse outer protective garment with soap and water. Remove outer protective garments. Wash hands and face. omplete the unchecked boxes in order to incorporate site specience.	Permits/Requirements - Complete RDW Inventory List			
Safety glasses	Hearing protection (plugs/muffs) Yes No Safety belt/harness Yes No Radio/cellular phone Yes No Barricades Yes No Gloves (Type – See note) Yes No Work/rest regimen Yes No Chemical resistant boot covers Yes No Tape up/use insect repellent Yes No Fire extinguisher Yes No				
Training Required Safe Work Packet Review, 29 CFR 1910.120 (Specific Training (See Section 2.0 of the HSGN Attachment 2-2). Tail Gate Meeting Attendance, Figure 4-7 Medical Clearance/Surveillance Required Completed a Medical Data Sheet (See Mobilization/Demobilization Safe Work Packet Section 3, Figure 3-6 of the HSGM for Blank for	7. Fire Extinguisher - Emergency Contact List and Map to Hospital (Table 6-1) or	g Program			

Figure 5-1

REMEDIATION DERIVED WASTE DRUM/CONTAINER INVENTORY LOG

This attachment is to be completed as investigative derived waste is generated. An updated inventory should be provided to your Point of Contact at the end of each 10-day shift.

Drum/ Container Number #	Drum/ Container Type	Media (Contents)	Location (SWMU and Well #, etc.)	Estimated Volume	Date Filled	Comments
1	5-Gallon Bucket 55-Gallon Drum (UN1A2)	Soil Cutting Purge/Development Water Decontamination Wash Waters		()-Gallons	, ,	
2	1100-Gallon Poly			()-Gallons	/ /	
3				()-Gallons	/ /	
4				()-Gallons	/ /	

Field Operations Leader:	Phone Number:	
NAVSTA Newport Point of Contact:	Phone Number:	

6.0 EMERGENCY ACTION PLAN

6.1 INTRODUCTION

This section of the HASP has been developed as part of aplanning effort to direct and guide field personnel in the event of an emergency. The first measure in accomplishing this objective is to define what is (and what is not) an emergency.

An emergency as defined in 1910.120 is:

An occurrence or condition that can or has resulted in an uncontrolled release of a hazardous substance or potential safety hazard (i.e., fire, explosion, and chemical exposure) associated with that release.

Incidental releases are not emergencies. An incidental release as defined in 1910.120 is:

The releases of a hazardous substance that can be absorbed, neutralized, or otherwise controlled and will not result in potential safety hazard (i.e., fire, explosion, chemical exposure) are not considered emergency responses.

Based on the above definitions, TtNUS will, through necessary services, provide initial response measures for incidents such as:

- Initial fire-fighting support and prevention.
- Initial spill control and containment measures and prevention.
- Removal of personnel from emergency situations.
- Provision of initial medical support for injury/illness requiring only first-aid level support.
- Provision of site control and security measures, as necessary.

Incidents and conditions above this level of participation are and will be considered emergencies. These events are considered beyond the capabilities of field personnel and available resources to provide emergency response safely. Therefore, the emergency response agencies listed in this plan are capable of providing the most effective response and will be designated as the primary responders in the event of an emergency. These agencies are located within a reasonable distance (within 5 minutes) from the area of site operations, which ensures adequate emergency response time.

This Emergency Action Plan conforms to the requirements of 29 Code of Federal Regulations (CFR) 1910.38(a), as allowed in 29 CFR 1910.120(I)(1)(ii). The FOL and/or the SSHO shall serve as the

Emergency Action Plan Administrators. All inquiries regarding the implementation of this Emergency Action Plan should be directed to them for resolution.

6.2 PRE-EMERGENCY PLANNING

Through the initial hazard/risk assessment effort, injury due to:

- Equipment failure,
- Improper operation (Struck by or caught between),
- Failure to employ selected PPE

are those conditions that could result in a potential injury or fatality associated with planned activities.

The following actions will be employed to minimize or eliminate these conditions that could lead to a potential injury/fatality.

The FOL and/or the SSHO will:

- Conduct equipment inspections to insure all equipment (heavy, power and hand tools) employed are in satisfactory condition.
- Traffic patterns, rules and regulations will be strictly designed given the small operating area and strictly enforced. Designate a Ground Spotter who will limit the number of trucks to be within the loading area to control congestion. Supply ground support personnel with airhorns to be used to halt operation if persons are caught in an emergency situation (caught between).
- Instruct personnel regarding the PPE to be employed for each task during site-specific training and Tail Gate/Safety Meetings and enforce use and application.

In addition, the following measures will be incorporated into project planning and execution. The SSHO will:

- Establishing and maintaining information at the project staging area (Support Zone) for easy access in the event of an emergency. This information includes the following:
 - On-site personnel medical data sheets.
 - MSDSs for all chemicals brought on site.
 - A logbook identifying personnel on-site each day.
 - Emergency notification phone numbers in all site vehicles

 Educating site workers to the hazards and control measures associated with planned activities at the site, and providing early recognition and prevention, where possible.

6.3 EMERGENCY RECOGNITION AND PREVENTION

The primary focus of this section is the ability to recognize and control factors, which could contribute to an emergency situation/conditions. The FOL and/or the SSHO will preview all site work location prior to committing personnel or resources. Their actions will be as follows:

- Identify, remove, and/or barricade physical hazards within the estimated work area. Ensure that
 approach paths to into the work area have established access and control points to ensure pedestrian
 traffic and workers are not impacted by vehicle traffic.
- Provide the necessary equipment to control potential emergencies (i.e., first aid kits, safety cans for flammable liquid storage, spill containment equipment, PPE, and emergency equipment such as portable fire extinguishers).
- Evaluate operations to ensure that necessary measures are taken to control and/or minimize the impact of emergency situations/conditions.

Field Crew shall:

- At the FOL and/or the SSHO's direction remove, or barricade physical hazards within the estimated work area identified by the FOL and/or the SSHO.
- Follow the guidelines for control of emergency conditions.
- Report any potential emergency situation(s) to the FOL and/or the SSHO.

It is recognized through the following activities that an emergency has the potential to occur and prevention will be initially directed to control those situations.

6.4 SAFE DISTANCES AND PLACES OF REFUGE

Upon activation of the on-site emergency alarm system the following actions will occur:

 All operations will cease. There are no operations considered critical which would have to be manned during an emergency. Field personnel will proceed to the north to the school parking lot. All personnel will remain at this
location until directed otherwise by the FOL and/or the SSHO. This will be the identified safe place of
refuge where from if necessary personnel will direct the emergency crews.

6.5 EMERGENCY MEDICAL TREATMENT

Tetra Tech NUS and subcontractor personnel are only permitted to provide treatment to the level of their First-Aid Training. It should also be noted all first-aid administered is based on voluntary provision. First aid provided will incorporate the following protective measures:

Emergency medical treatment will be initiated under the following guarded restrictions:

- Notify the FOL and/or the SSHO of the incident.
- Take the necessary precautions to prevent direct contamination with the injured person's body fluids.
 Recommended practices include, but not limited to the following:
 - Use surgeons gloves when handling cuts, abrasions, bites, punctures, etc. or any part of the injured person. The use of safety glasses and surgeons masks maybe necessary, if there is the potential for uncontrolled spread of body fluids. In situations where contact occurs with non-intact skin, eyes, mouth, or other mucous membranes should be immediately reported to the PHSO.
 - Should Cardio-Pulmonary Resuscitation (CPR) be required, use a CPR Micro-Shield mouthpiece when administering CPR to prevent contact with the injured party's body fluids.

In order to engage these protective measures the FOL shall insure that these items are part of their first-aid kit.

6.6 EMERGENCY ALERTING AND ACTION/RESPONSE PROCEDURES

As TtNUS personnel will usually be working in close proximity to each other, hand signals, voice commands will comprise the mechanisms to alert site personnel of an emergency.

If an incident occurs, site personnel will initiate the following procedures:

Initiate the evacuation via hand signals, voice commands, line-of-site communication.

- Evacuate non-essential personnel.
- Initiate initial response procedures.

 Describe to the FOL (who will serve as the Incident Commander) what has occurred in as much detail as possible.

In the event that site personnel cannot control the incident through offensive and/or defensive measures, the FOL and/or the SSHO will enact emergency notification procedures to secure additional outside assistance in the following manner:

Contact appropriate agency to report the incident (see Table 6-1). Give the emergency operator the
location of the emergency, the type of emergency, the number of injured, and a brief description of
the incident. Stay on the phone and follow the instructions given by the operator. The operator will
then notify and dispatch the proper emergency response agencies.

6.7 EMERGENCY CONTACTS

Prior to initiating field activities, all personnel will be thoroughly briefed on the emergency procedures to be followed in the event of an accident. Table 6-1 provides a list of emergency contacts and their associated telephone numbers. This table must be posted where it is readily available to all site personnel. Facility maps should also be posted showing potential evacuation routes and designated meeting areas.

6.8 WORK SITE IDENTIFICATION - SAFETY BULLETIN BOARD

The TtNUS SSHO will ensure that a Safety and Health Bulletin Board or similar information exchange location is erected and maintained on site in an area that is commonly accessed by site workers. This bulletin board will be maintained with current information, in clear view of onsite workers, and will be protected against the elements and against unauthorized removal. At a minimum, the following information shall be maintained on the bulletin board:

- 1. Map depicting the route to the nearest medical care facility (This will also be provide for all site vehicles and First Aid Kits).
- 2. Emergency phone numbers (This will also be provide for all site vehicles and First Aid Kits).
- 3. Safety and Health promotional posters (TtNUS H&S Policy; OSHA Poster)

6.9 MARKING TEMPORARY STRUCTURES AND TRAILERS.

All structures and/or trailers used on site will be marked as follows.

Site must be clearly marked/posted to include:

- Name of Company
- Name of Site Supervisor/Manager
- Site Safety Officer (TBD Name and Phone Number)
- Emergency Contact Numbers

All temporary structures will be tied down.

6.10 DAILY LOG BOOK

The FOL/SSHO must make entries into the Daily Log Book including: weather conditions, site personnel, new arrivals, air monitoring data, indications or suspicion of exposure, deviations from this HASP, and general health and safety problems and corrective measures. Daily Activities Sheets or similar documentation will be used and submitted for this purpose.

6.11 BUDDY SYSTEM

The "buddy system" will be employed for all site activities.

6.12 FIRE HAZARDS

If there are fuels and chemicals present at this site that are flammable and potentially explosive. Spark-producing devices, such as lighters, and smoking will not be permitted in or near the area at which flammable and potentially explosive fuels and chemicals will be used. Dry chemical, foam, or carbon dioxide fire extinguishers must be readily available during all work activities. Every precaution will be made to keep waste product and vapors from ignition sources. These measures include:

- Providing fire protection equipment in all areas where fuels and chemicals are stored and/or dispensed.
- Prior to performing Hot Work Activities obtain a Hot Work Permit

The following activities will require a Hot Work Permit:

- Open flame and heat producing devices.
- 2. Welding and/or cutting operations.
- 3. Flammable materials storage.

6.12.1 FIRE EXTINGUISHERS

Use and Inspection. Fire Extinguisher Use and Inspection procedures will be conducted in support of the activities to be conducted at Melville Water Tower, Rhode Island. The following text is intended to provide general instruction to the field personnel charged with this responsibility.

Fire Extinguisher Use. All personnel trained in incidental response measures may be required to use and operate a fire extinguisher in response to an incipient stage fire. Therefore, the following instruction is provided and will be conveyed to all field personnel as part of site-specific training.

To use a portable fire extinguisher, the user should be familiar with the operation of the specific fire extinguisher located in the workplace. The following procedure will properly extinguish a small fire.

1. Determine whether the extinguisher is adequate for this fire.

Rating number – The rating number assigned to a fire extinguisher is based on the capabilities of that fire class, for example

Class 5 A - Will provide extinguishing capabilities equal to that of 5 gallons of water.

Class 20 B - Will provide extinguishing capabilities equal to 20 square feet of flammable liquid burning.

Class C & D are not rated as to their limitations.

- 2. If adequate, hold the extinguisher upright and pull the ring pin.
- 3. Stand back 10 feet and aim at base of fire. Be careful not to spread burning material with pressurized extinguishing material.
- 4. Squeeze lever; sweep extinguisher in a side-to-side motion.

1) IDENTIFY THE TYPE OF FIRE (CLASS A, B, C, D).

CLASSES OF FIRE/FIRE EXTINGUISHER IDENTIFICATION

Fire is divided into four classes for easy identification and extinguishment. The type of fuel or ignition source will determine the type of extinguishing medium required.

Class A - Ordinary combustibles (wood, paper, rubber, plastic, and cloth). Extinguishers suitable for Class A fires should be identified by a triangle containing the letter "A." If colored, the triangle is green.





Class B - Flammable liquids, gases, and greases. Extinguishers suitable for Class B fires should be identified by a square containing the letter "B." If colored, the square is red. This type of extinguisher is effective on small petroleum product fires.









Class C - Electrically energized systems. Extinguishers suitable for Class C fires should be identified by a circle containing the letter "C." If colored, the circle is blue.

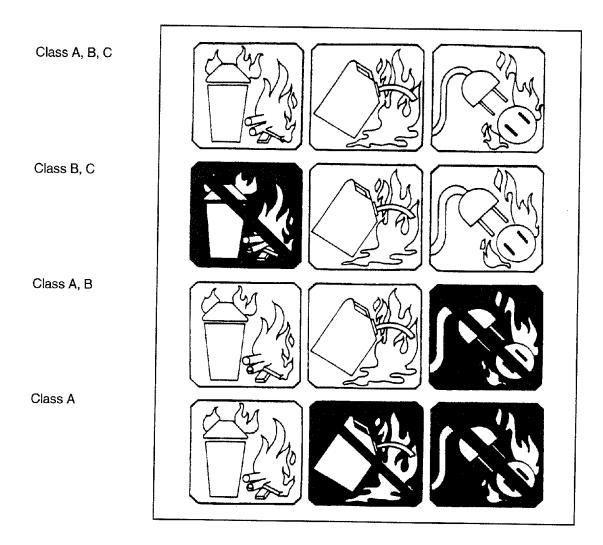




Class D - Combustible metals (sodium, magnesium, phosphorus). Extinguishers suitable for fires involving metals should be identified by a five-pointed star containing the letter "D." If colored, the star is yellow.



Note: Water and other extinguishing media, such as carbon dioxide and dry chemicals, are ineffective on metal fires.



Multi-class (ABC) Fire extinguishers will be provided for use on site. If you will buy a Fire Extinguisher, this is the type recommended. Size or rating recommended is 2A:B:C for general activities and at least 10B for storage or dispensing >5-gallons.

Portable Fire Extinguisher Placement/Mounting

Portable Fire Extinguishers will be placed/mounted in clear view in the areas where flammable materials are stored and/or dispensed. Mounting and placement of fire extinguishers will follow the following requirements

Fixed Locations (Flammable Storage)

- Extinguisher location will be marked by a red painted post or signage to indicate extinguisher location
- The travel distance to access a fire extinguisher shall be no greater than 50 feet.
- The fire extinguisher will be mounted at a maximum height of four feet.

Mobile Locations (Support Vehicles)

All vehicles carrying fuel containers or used in the dispensing of fuel will carry at a minimum a 10B rated fire extinguisher.

PORTABLE FIRE EXTINGUISHER INSPECTION.

All fire extinguishers used in support of this field effort will be inspected on the following frequencies:

- A certified provider will perform maintenance checks of fire extinguishers at least once a year. A tag
 attached to the neck of the fire extinguisher will indicate documentation of the maintenance check.
- All fire extinguishers will have a current hydrostatic inspection. For the type of extinguishers selected for use at Melville Water Tower, hydrostatic inspections are required every 12 years.
- All fire extinguishers will be inspected monthly. The monthly inspection will cover the following
 - Are the fire extinguisher(s) placed in their designated location(s)?
 - o Is the location conspicuously marked (Top 18 inches of the mounting pole to be painted red)?
 - o Is the access impeding travel to the fire extinguisher blocked or restricted in any way?
 - o Has the fire extinguisher been partially or completely discharged?
 - Are there signs of obvious physical damage?
 - Does the fire extinguisher shows sufficient pressure and are all of the tamper indicators are in place?

See the Fire Extinguisher Inspection Checklist provided in this Safe Work Packet.

This inspection shall be documented on the attached tag provided by the maintenance/hydrostatic inspection service. The SSHO will conduct monthly inspections. All other upper level inspection requirements will be performed by a qualified vendor.

FIRE INSPECTION CHECKLIST

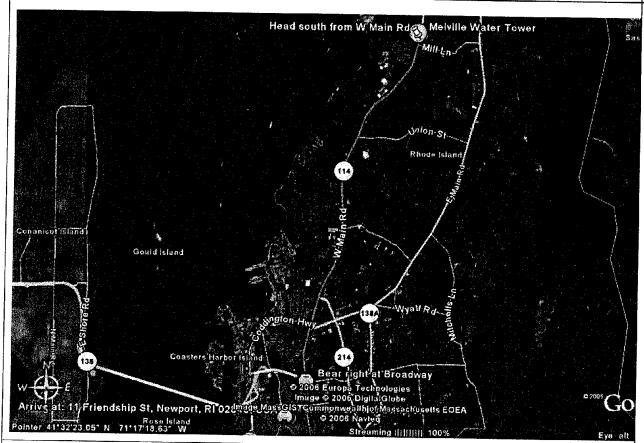
Complete a Fire Extinguisher Checklist for each fire extinguisher used on the job site in support of project activities.

Project Name/Location:_		CTO#	Date Of Inspection:					
Fire Extinguisher Identification Number:	Fire Extinguisher Rating: Hydrostatic Test Date:	Fire Ext	tinguisher Location:					
Measurement Criteria	Yes	No	N/A	Corrective Measure				
Is the location conspicuous	placed in their designated location by marked (For Example - Top 18 ted red or other identifier indica	inches of the						
Is the path of travel or accordin any way?	ess to the fire extinguisher blocked	d or restricted						
Has the fire extinguisher be	en partially or completely discharg	ed?						
Are there signs of obvious	physical damage?							
Does the fire extinguisher tamper indicators are in pla	shows sufficient pressure and a ce?	re all of the						
Comments:		· · · · · · · · · · · · · · · · · · ·	<u> </u>					

Note: Complete one checklist per/extinguisher/location.

TABLE 6-1 EMERGENCY CONTACT LIST AND MAP TO HOSPITAL NAVAL STATION NEWPORTNEWPORT, RHODE ISLAND

CONTACT	
	PHONE NUMBER
Naval Station Newport	
EMERGENCY (Fire and Rescue) OR Police Emergency Number	(401) 841-3333 (Fire Dept.)
, , , , , , , , , , , , , , , , , , ,	(401) 841-3241 (Police Department)
Newport Hospital	(401) 845-1120 (Emergency)
11 Friendship Street	(101) 040 1120 (Emergency)
Newport, Rhode Island	
Chemtrec	(800) 424-9300
National Response Center	(800) 424-8802
Naval Station Newport	(000) 424 0002
Site Contact: Cornelia Mueller	(401) 841-7561
Project Manager/Field Operations Leader:	(978) 658-7899 (x 1239)
Stephen Parker, LSP	(070) 000 1009 (x 1209)
CLEAN Health and Safety Manager:	(412) 921-8912
Matt Soltis, CIH, CSP	(412) 021-0312
PHSO Tom Dickson, CSP	(412) 921-8457
WorkCare	1-800-455-6155



Directions to the Hospital:

Newport Hospital 11 Friendship Street Newport, RI 02840

Telephone: (401) 253-4063 (general number) (401) 845-1120 (emergency)

From the Site:

- 1. Turn right (South) from West Main go 5.7 miles,
- Bear right onto Broadway for <0.6 miles
- 3. Turn left onto Friendship Street for 0.1 miles
- 4. Arrive at 11 Friendship Street, Newport

Total distance 6.4 miles approximately 11 minutes travel time.

FIGURE 6-1 POTENTIAL EXPOSURE PROTOCOL

The purpose of this protocol is to provide guidance for the medical management of injury situations. In the event of a personnel injury or accident:

- Rescue, when necessary, employing proper equipment and methods.
- Give attention to emergency health problems -- breathing, cardiac function, bleeding, and shock.
- Transfer the victim to the medical facility designated in this HASP by suitable and appropriate conveyance (i.e. ambulance for serious events)
- Obtain as much exposure history as possible (a Potential Exposure report is attached).
- If the injured person is a Tetra Tech NUS employee, call the medical facility and advise them that the patient(s) is/are being sent and that they can anticipate a call from the WorkCare physician. WorkCare will contact the medical facility and request specific testing which may be appropriate. WorkCare physicians will monitor the care of the victim. Site officers and personnel should not attempt to get this information, as this activity leads to confusion and misunderstanding.
- Call WorkCare at 1-800-455-6155 and enter Extension 109, or follow the voice prompt after hours and on weekends and be prepared to provide:
 - Any known information about the nature of the injury.
 - As much of the exposure history as was feasible to determine in the time allowed.
 - Name and phone number of the medical facility to which the victim(s) has/have been taken.
 - Name(s) of the involved Tetra Tech NUS, Inc. employee(s).
 - Name and phone number of an informed site officer who will be responsible for further investigations.
 - Fax appropriate information to WorkCare at (714) 456-2154.
- Contact Corporate Health and Safety Department (Matt Soltis) at 1-800-245-2730.

As data is gathered and the scenario becomes more clearly defined, this information should be forwarded to WorkCare.

WorkCare will compile the results of all data and provide a summary report of the incident. A copy of this report will be placed in each victim's medical file in addition to being distributed to appropriately designated company officials.

Each involved worker will receive a letter describing the incident but deleting any personal or individual comments. A personalized letter describing the individual findings/results will accompany this generalized summary. A copy of the personal letter will be filed in the continuing medical file maintained by WorkCare.

TETRA TECH NUS, INC. INJURY/ILLNESS PROCEDURE WORKER'S COMPENSATION PROGRAM

WHAT YOU SHOULD DO IF YOU ARE INJURED OR DEVELOP AN ILLNESS AS A RESULT OF YOUR EMPLOYMENT:

- Stop work as needed to ensure no further harm is done.
- · If injury is minor, obtain appropriate first aid treatment.
- If injury or illness is severe or life threatening, obtain professional medical treatment at the nearest hospital emergency room. Check with your office location or project health and safety plan for specific instructions.
- If incident involves an injury, illness, or chemical exposure on a project work site, follow instructions in provided in Figure 6-2 of this the Health & Safety Plan.
- Immediately report any injury or illness to your supervisor or office manager. In addition, you must
 contact your Human Resources representative, Marilyn Duffy at (412) 921-8475, and the Corporate
 Health and Safety Manager, Matt Soltis at (412) 921-8912 within 24 hours of the injury. You will be
 required to complete an Injury/Illness Report. You may also be required to participate in a more
 detailed investigation with the Health Sciences Department.
- In the event of a serious near-miss incident, a "Serious Near Miss Report" (Form AR-2, available online at https://go2.tetratech.com under "Departments", "Health and Safety", "Accident Reporting Procedures", hyperlink for "Serious Near Miss Report") must be completed and faxed to the Corporate Health and Safety Manager within 48 hours.

If further medical treatment is needed, our insurance carrier, ACE, will provide information on the authorized providers customized to the location of the injured employee. You can find this information by accessing the website of ACE's claims handler, ESIS, at: www.esis.com. These providers are to be used for treatment of Worker's Compensation injuries subject to the laws of the state in which you work.

ADDITIONAL QUESTIONS REGARDING WORKER'S COMPENSATION:

Contact your local Human Resources representative (Marilyn Duffy), Corporate Health and Safety Manager (Matt Soltis), or Corporate Administration in Pasadena, California, at (626) 351-4664.

Worker's compensation is a state-mandated program that provides medical and disability benefits to employees who become disabled due to job related injury or illness. Tetra Tech, Inc. and its subsidiaries pay premiums on behalf of their employees. This program is based on a no-fault system, and benefits are provided for covered events as an exclusive remedy to the injured employee regardless of fault. The types of injuries or illnesses covered and the amount of benefits paid are regulated by the state worker's compensation boards and vary from state to state. Corporate Administration in Pasadena is responsible for administering the Company's worker's compensation program. The following is a general explanation of worker's compensation provided in the event that you become injured or develop an illness as a result of your employment with Tetra Tech or any of its subsidiaries. Please be aware that the term used for worker's compensation varies from state to state.

WHO IS COVERED:

All employees of Tetra Tech, whether they are on a full-time, part-time or temporary status, working in an office or in the field, are entitled to worker's compensation benefits from the first day of work. All employees must follow the above injury/illness reporting procedures. If you are working out-of-state and away from your home office, you are still eligible for worker's compensation benefits. Consultants, independent contractors, and employees of subcontractors and employees from temporary employment agencies are not covered by Tetra Tech's Worker's Compensation plan.

WHAT IS COVERED:

If you are injured or develop an illness caused by your employment, worker's compensation benefits are available to you subject to the laws of the state you work in. Injuries do not have to be serious; even injuries treated by first aid practices are covered and must be reported.

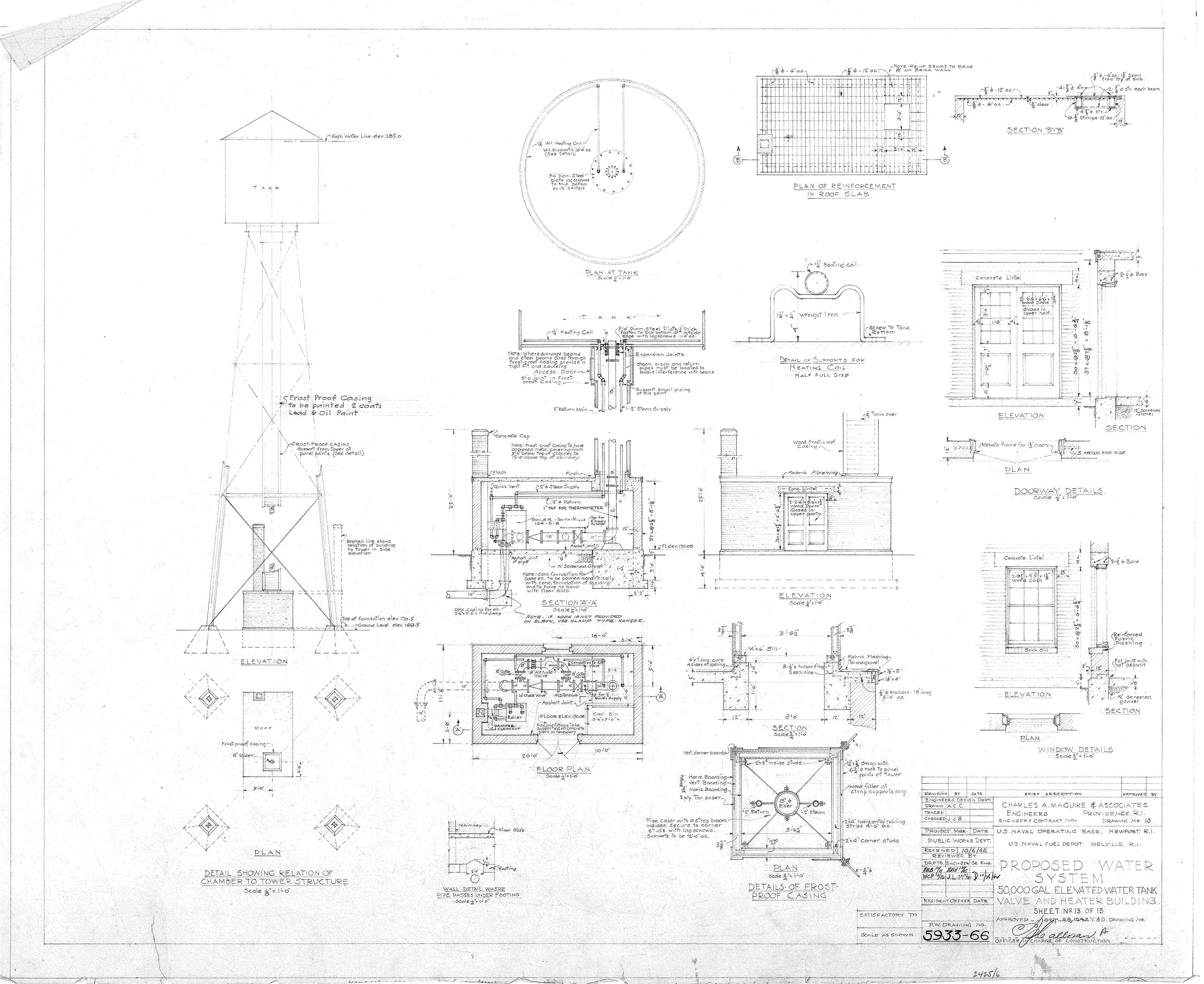
This form contains information relating to employee health and must be used in a manner that protects the confidentiality of the employee to the extent possible while the information is being used for occupational safety and health purposes.

Persons involved in an incident or near miss must complete either AR-1 or AR-2 which are provided in Section 3.0 of your HSGM.

FIGURE 6-2 POTENTIAL EXPOSURE REPORT

Na	ame:	_ Date of Expos	ure:
So	ocial Security No.; Age:		Sex:
Cli	ent Contact:	Phone No.:	
Со	ompany Name:		
I.	Exposing Agent Name of Product or Chemicals (if known): Characteristics (if the name is not known) Solid Liquid Gas Fume Mist	Vapor	
II.	Dose Determinants What was individual doing? How long did individual work in area before signs/symptoms Was protective gear being used? If yes, what was the F Was there skin contact? Was the exposing agent inhaled? Were other persons exposed? If yes, did they experience	PPE?	
111.	Signs and Symptoms (check off appropriate symptoms)		
	Immediately With Expos Burning of eyes, nose, or throat Tearing Headache Cough Shortness of Breath		hest Tightness / Pressure Nausea / Vomiting Dizziness , Weakness
	Delayed Sympton	ms:	
	Weakness Nausea / Vomiting Shortness of Breath Cough		Loss of Appetite Abdominal Pain Headache Numbness / Tingling
IV.	Present Status of Symptoms (check off appropriate sy Burning of eyes, nose, or throat Tearing Headache Cough Shortness of Breath Chest Tightness / Pressure Cyanosis Have symptoms: (please check off appropriate response Improved: Worsened: Remained Lease Check off appropriate response Improved: Worsened: Remained Lease Check off appropriate response Improved: Remained Lease Check Off appropriate Remained Rema	e and give durati	Nausea / Vomiting Dizziness Weakness Loss of Appetite Abdominal Pain Numbness / Tingling
٧.	Treatment of Symptoms (check off appropriate responsions) None: Self-Medicated: Physician Treate	se)	

APPENDIX B DESIGN DRAWING, MELVILLE WATER TOWER, 1943



APPENDIX C SOIL INVESTIGATION REPORT 2006



C-NAVY-02-07-2325W

February 8, 2007

Project Number GN1611

Commander Officer NAVFAC Mid-Lant Attn: Jim Colter 9742 Maryland Avenue Norfolk, Virginia 23511-3095

Reference:

CLEAN Contract No. N62472-03-D-0057

Contract Task Order No. 008

Subject:

Results from Soil Sampling, Former Melville Water Tower

Portsmouth, Rhode Island

Dear Mr. Colter:

In accordance with the Statement of Work (SOW) from the Naval Facilities Engineering Command, EFA Northeast, dated 5/9/06, Tetra Tech NUS, Inc. (TtNUS) collected samples of soil for analysis of lead from the area underneath and surrounding the former location of the Navy Water Tower located at 1335 West Main Road near the Melville School, in Portsmouth Rhode Island during the period of September 25 through September 28, 2006. This letter and its attachments present the findings of this sampling and analysis effort.

Background:

Soil sampling and analysis described in this letter was conducted to confirm the findings of the sampling and sample screening effort conducted by the Rhode Island Department of Environmental Management (RIDEM) on December 27, 2005. Based on the screening analysis RIDEM concluded that there were elevated concentrations of lead and detectable concentrations of arsenic in soil around the tower, and cited the paint from the water tower as a possible source (RIDEM 3/29/06).

Figure 1 depicts the former location of the water tower relative to the surrounding properties.

In May 2006, TtNUS collected chips of paint from the steel structure and the wooden "Freeze Box" at the site, prior to their demolition. Lead was found in paint from four of the five samples tested, at concentrations typical of lead-formulated paint. While the presence of arsenic in one paint chip sample was found at a concentration of 74 mg/kg, it was concluded that based on the predominance of lead in the paint, contaminants present due to paint releases should be determined through sampling and analysis for lead only (TtNUS 6/2/06). While arsenic is known to have been used in some formulations of pigments used in paint, arsenic is also present in soil as a natural condition.

The sampling and analysis program was conducted in accordance with the Field Sampling Plan for Soil Investigation, Melville Water Tower, Portsmouth Rhode Island (Field Sampling Plan), prepared by TtNUS. The Field Sampling Plan was drafted June 2, 2006, and reviewed by RIDEM and the U. S. Environmental Protection Agency (USEPA). Comments on the Draft Field Sampling Plan were received from RIDEM 6/14/06 and from the USEPA 6/19/06. The comments were taken into consideration, and responses were submitted to both parties on 7/27/06. The Revised Field Sampling Plan was submitted on August 1, 2006.

Mr. James Colter Remedial Project Manager February 8, 2007 Page 2 of 5

Sampling and Analysis:

Samples of soil were collected and analyzed for lead only, in accordance with the work plan. Sample stations were selected to characterize the site using a grid oriented approximately north to south, with intersecting points 25 feet apart. Samples were taken at each grid intersection, in order to identify a pattern of lead deposition. Samples were collected from the surface soil at all grid positions, and from subsurface soil at a subset of those grid positions. In addition to the grid samples, one sample station was added next to each of the four footings for the former tower.

While on site, two stations were moved because the recent installation of a temporary water connection resulted in soil excavated at these stations. The station at grid point B175 was shifted approximately 20 feet south to be beyond the area excavated for the temporary connection, and renamed C162. The station A175 was split into two stations, and shifted north approximately 26 feet: Two stations were located north of the pad, and named Z163 and Z183.

Samples were collected using hand tools from depths of 0-3 inches (45 Locations), 3-6 inches (14 locations), 6-12 inches (14 locations), and with hydraulic tools from 12-24 inches (10 locations). The 0-3 inch interval and 3-6 inch interval were selected to match those collected for screening analysis by RIDEM in December 2005. The 6-12 inch interval was selected for a subset of locations to help determine depth of the highest concentrations of lead present in soil and to allow possible data averaging for a 0-1 foot interval. The 12-24 inch interval was also selected the same subset of locations as the 6-12 inch interval. This "top-down" sampling approach was selected based on the presumption that the lead contamination found by RIDEM is a result of paint deposition from above, and that this lead contamination would not likely have migrated into the deeper soils.

Samples from the upper intervals were collected with hand tools to assure adequate volume without sample recovery problems. Samples from the 12-24 inch interval were collected with a hydraulic direct-push technology soil probe system (DPT). However, at two locations (D175, and C162) the DPT rig could not gain access due to fencing and guard rails, and the depth interval of 12-24 inches was not achievable using hand tools. Additionally, the deep samples at location A75 and F2 (southwest tower footing) were attempted using DPT but not acquired due to poor recovery at the target interval despite repeated attempts. The large amount of gravel underlayment interfered with deep sample acquisition. Also, weathered bedrock was noted in the deep sample at location D75.

Samples were collected for analysis by total digestion according to USEPA SW846 Method 6010B. Raw data from the laboratory was reviewed by TtNUS using a Tier II data validation process, according to the Region I EPA-NE Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses (Feb 1989).

Each sample was collected in duplicate and separate aliquots of each sample were analyzed by two different laboratories. This approach was utilized because it is known that sample heterogeneity is common for soil, and particularly common for soil contaminated with lead from paint. Such heterogeneity is a result of the nature of the contaminant: Lead paint typically falls in chips or particles prior to being entrained in the soil, and once there, it is not likely to break down further under normal conditions. Even if the paint matrix continues to degrade, the lead is present in the paint as particles in suspension, not as a dissolved substance. Therefore, after total breakdown of the paint material, the lead mostly remains as a particulate in the soil. During the laboratory analysis, the analyst opens the sample container and randomly grabs a small quantity of the material inside for acid digestion. If the analyst does not happen to grab some of the lead particles with the soil matrix, the result can be biased high. The

Mr. James Colter Remedial Project Manager February 8, 2007 Page 3 of 5

heterogeneity of the samples was anticipated and compensated by duplicate analysis of all samples collected in order to reduce these biases.

It should be noted that during soil sample collection, paint chips were not obvious in the soil, suggesting that the release or releases could have been fine particles, such as result during a sandblasting operation. It should also be noted that the gravel area west of the sampling grid was reported to be used as a laydown area by the contractor who demolished the tank, and some blue paint chips were noted on the ground surface in this area. The lay-down area was not sampled as a part of this effort.

Sampling Conducted by Others

During the period of July 20 and August 14, 2006, a small excavation was conducted for the purpose of installing a temporary water connection to bypass the tower. The excavation was performed to place a concrete foundation at the east portion of the site, against the fence at West Main Road. During this excavation, side wall samples and bottom of excavation samples were collected by NAVSTA personnel, overseen by RIDEM. The data from the samples collected are described below.

Results:

A summary of results are provided on Tables 1 and 2, attached.

Table 1 presents results from samples collected by TtNUS, showing individual results from each laboratory, the relative percent difference calculated from the two analyses conducted, and the maximum concentrations measured at each of the locations. The maximum result for each of the sample stations was used to depict the presence of lead in soil at the site (Figures 2 through 6, attached). This approach may show a high bias to interpretation of the results, however, this is an acceptable and conservative approach to data interpretation used for the protection of public health.

Table 2 presents results from samples collected by others from the excavation of the foundation for the temporary water connection. As noted in Table 2, the north east bottom sample from this excavation exceeded a concentration of 150 mg/kg lead, and RIDEM requested this soil be removed. It was recognized that a removal action goal for this site had not been determined at the time of this request, however, because the soil was to be covered with a semi-permanent structure and that soil would not be accessible after a removal action goal was established, NAVSTA agreed to remove these soils so as not to delay the water connection.

Figures 2 through 5 present the results compared to RIDEM direct exposure criteria by depth. Stations marked in green were found to be below the RIDEM direct exposure criteria for lead in residential use soil (R-DEC) of 150 mg/kg. Stations marked in yellow were found to be above the R-DEC for lead, but below the direct exposure criteria for lead in industrial/commercial use property (I/C-DEC) of 500 mg/kg. Stations marked in orange were found to be above the I/C-DEC, but less than twice that value. Stations marked in red were found to be at or above twice the I/C-DEC level (1000 mg/kg and above).

These results indicate the presence of elevated concentrations of lead in soil in the vicinity of the former water tower. This signature is clearly shown on Figure 2 which shows the concentrations at the 0-3 inch interval. Figure 3 (3-6 inch interval) shows the highest concentrations of lead still focused under the former water tower, and Figures 4 and 5 show concentrations decreasing with depth. The one sample at 12-24 inches that depicts lead in excess of 1000 mg/kg was collected adjacent to the northeast footing for the former tower (Figure 5).

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Discussion:

The distribution of the maximum concentrations from the samples collected confirms RIDEM speculation that lead from the former water tower structure has come to reside in the soil under that structure. However, most of the lead contaminants are localized to the area directly under the former tower. Figure 6 presents relative concentrations of lead detected in the soil samples. This figure clearly shows that the highest concentrations are present under the former tower. Concentrations appear to decrease with depth, and at most locations, concentrations drop below enforceable standards within two feet of the ground surface. Based on this distribution, the lead from the paint on the tower appears to have been trapped in the soil, and impacts to other media such as groundwater are not anticipated.

Overall, concentrations of lead in surface soil exceeding state criteria are within the area currently fenced. The highest concentrations are present in the area previously secured by the fence around the water tower. Concentrations of lead in the surface soil adjacent to the walkway between the school and the residential area to the south are below all state criteria with the exception of one station — A150, which showed concentrations of 130 mg/kg (below criteria) and 219 mg/kg (above criteria).

RIDEM requested that TtNUS sample a debris pile that was previously seen by them in the wooded area south of the site. The debris pile was sought on two occasions, once with RIDEM present and once without their representation. No debris pile was evident, however, it was noted at there is metal material at the edge of the tree line south of the tower, and this metal material appears to be scrap from previous maintenance of the tower. Although no specific pile was noted, metal was found scattered in the area of grid points E50, E75 and E100 (Figure 2). This material may be the source for slight exceedances of R-DECs at these stations. Other debris may be present in this area and obscured by seasonal vegetation.

The sample Z183 is located within two feet of the government fence that bounds the study area and separates it from the street (Figure 2). The elevated concentration at this station (536 mg/kg) may well be a result of either past treatments of the fence and/or lead dust from traffic on the four lane West Main Road, located only 4 feet east of the fence (refer to attached photos). The lead found at this location is not anticipated to be a result of the water tower, and is more likely to be a result of traffic along the road.

The side wall samples taken from the excavation for the temporary water connection were collected from the 6-12 inch interval, as shown on Figure 4. The distribution of the results from these samples further shows a lead signature near the fence and roadway. The lead found at this location is also not anticipated to be a result of the water tower, and is more likely to be a result of traffic along the road.

It should be noted that RIDEM Division of Site Remediation provides a R-DEC of 150 mg/kg as an enforceable standard for soil at residential properties. However, the Rhode Island Department of Health (R32-24.6-PB, February 1992 and updated January 2005) provides a permissible "lead-safe" standard for lead in soil due to presence of lead-based paint between 150 to 400 mg/kg when soil is exposed. Soil that is covered (by asphalt, or similar material) may contain concentrations of lead up to 1,000 mg/kg and be considered "lead safe" so long as the cover remains intact.

Summary:

Lead was found in paint taken from the tower prior to demolition in May 2006, at concentrations typical of lead-formulated paint. RIDEM and the Navy speculated that the lead found in the soil by RIDEM was present as a result of lead paint deposited on the ground from the water tower and former maintenance operations.

Mr. James Colter Remedial Project Manager February 8, 2007 Page 5 of 5

Soil sampling for lead conducted in September 2006 shows a predominance of lead in the soil under and surrounding the former water tower at concentrations exceeding the state standards. Concentrations decrease with depth, and indicate that soil exceeding the state standards exists within the top six inches of the ground surface across most of the affected area, but up to and beyond 24 inches below ground surface adjacent to the tower footings and former boiler house foundation, all of which are still in place.

Some lead contamination appears to be present at the edge of the wooded area to the south of the former water tower. However, these concentrations are not as high as those in the vicinity of the tower. In addition, slightly elevated concentrations of lead were found along West Main Road and within 2 feet of the fence line at the east of the site, but these are likely to be a result of roadway contaminants and / or former treatment of the fence which is also still present.

Recommendations:

It is recommended that a remediation plan be developed for the affected area as shown on the attached Figures 2 through 6. A conservative approach for prompt, effective and permanent remediation would involve removal of soil exceeding 150 mg/kg lead in soil due to the proximity to the school and residential properties to the south, and disposal of this material in accordance with local, state, and federal regulations. Effective removal of this material will require removal of the former water tower footings, and the boiler house foundation as well. Finally, the gravel area used for lay-down during demolition of the water tower should also be removed to approximately 3 inches to assure any paint chips lost in this area are removed from the site. In the meantime, the site should remain fenced to prevent access to the affected area.

If you have any questions on this material, please do not hesitate to contact me.

Very truly yours,

Stephen S. Parker, LSP

Project Manager

SSP/rp

Enclosures

K. Keckler, USEPA (w/encl.)

P. Kulpa, RIDEM (w/encl.)

C. Mueller, NAVSTA (w/encl.)

J. Stump, Gannett Fleming (w/encl.) NAVSTA RAB (c/o C. Mueller, w/encl.)

J. Trepanowski/G. Glenn, TtNUS (w/encl.)

File GN1611-3.2 (w/o encl.)/GN1611-8.0 (w/encl.)

TABLE 1
SUMMARY OF LEAD ANALYTICAL RESULTS
SOIL INVESTIGATION AT THE FORMER MELVILLE WATER TOWER
1331 WEST MAIN ROAD PORTSMOUTH RE

Grid Location			Analytical Results							
Gria i			De	oth in I	nches	Laboratory 1	Laboratory 2	RPD	Maximum Concentration	Units
A	0	MWT-S-SOA0-0003	0	to	3	22	60	92%	60	MG/KG
A	25	MWT-S-SOA25-0003	0	to	3	12	27	78%	27	MG/KG
Α	50	MWT-S-SOA50-0003	0	to	3	130	246	62%	246	MG/KG
_A	75	MWT-S-SOA75-0003	0	to	3	730	3310	128%	3310	MG/KG
Α	75	MWT-S-SOA75-0306	3	to	6	35	369	165%	369	MG/KG
<u>A</u>	75	MWT-S-SOA75-0612	6	to	12	42	124	99%	124	MG/KG
Α	100	MWT-S-SOA100-0003	0	to	3	410	697	52%	697	MG/KG
A	125	MWT-S-SOA125-0003	0	to	3	130	322	85%	322	MG/KG
Α	150	MWT-S-SOA150-0003	0	to	3	130	219	51%	219	MG/KG
В	0	MWT-S-SOB0-0003	0	to	3	170	345	68%	345	MG/KG
В	25	MWT-S-SOB25-0003	. 0	to	3	190	91	70%	190	MG/KG
В	25	MWT-S-SOB25-0306	3	to	6	30	86	96%	86	MG/KG
В	25	MWT-S-SOB25-0612	6	to	12	10	70	150%	70	MG/KG
В		MWT-S-SOB25-1224	12	to	24	21	21	1%	21	MG/KG
В	50	MWT-S-SOB50-0003	0	to	3	610	1110	58%	1110	MG/KG
В	75	MWT-S-SOB75-0003	0	to	3	1800	2180	19%	2180	MG/KG
В	75	MWT-S-SOB75-0306	3	to	6	4200	12300	98%	12300	MG/KG
В		MWT-S-SOB75-0306-D	3	to	6	8100	12500	43%	12500	MG/KG
В		MWT-S-SOB75-0612	6	to	12	2200	7180	106%	7180	MG/KG
B		MWT-S-SOB75-1224	12	to	24	730	458	46%	730	MG/KG
В		MWT-S-SOB100-0003	0	to	3	740	1570	72%	1570	MG/KG
В		MWT-S-SOB125-0003	0	to	3	87	182	71%	182	MG/KG
В		MWT-S-SOB125-0306	3	to	6	170	313	59%	313	MG/KG
В		MWT-S-SOB125-0612	6	to	12	210	379	57%	379	MG/KG
В		MWT-S-SOB125-1224	12	to	24	400	65	144%	400	MG/KG
В		MWT-S-SOB150-0003	0	to	3	47	73	43%	73	MG/KG
С		MWT-S-SÖC0-0003	0	to	3	10	72	153%	72	MG/KG
С		MWT-S-SOC25-0003	0	to	3 [390	559	36%	559	MG/KG
Ç		MWT-S-SOC25-0003-D	0	to	3	530	757	35%	757	MG/KG
С		MWT-S-SOC50-0003	0	to	3	820	682	18%	820	MG/KG
С		MWT-S-SOC75-0003	0	to	3	890	2460	94%	2460	MG/KG
С		MWT-S-SOC75-0306	3	to	6	600	1090	58%	1090	MG/KG
С		MWT-S-SOC75-0612	_ 6	to	12	530	873	49%	873	MG/KG
С		MWT-S-SQC75-1224	12	to	24	20	34	51%	34	MG/KG
C		MWT-S-SOC100-0003	0	to	3	480	317	41%	480	MG/KG
C		MWT-S-SOC125-0003	0	to	3	32	100	103%	100	MG/KG
С	150	MWT-S-SOC150-0003	0	to	3	22	47	73%	47	MG/KG
c_	162	MWT-S-SOC162-0003	0	to	3	34	87	88%	87	MG/KG
С		MWT-S-SOC162-0306	3	to	6	20	42	71%	42	MG/KG
С		MWT-S-SOC162-0612	6	to	12	12	42	112%	42	MG/KG
C		MWT-S-SOC175-0003	0	_to	3	26	54	69%	54	MG/KG
C		MWT-S-SOC175-0003-D	0	to	3	18	63	111%	63	MG/KG
D		MWT-S-SOD0-0003	0	lo	3	29	77	91%	77	MG/KG
D		MWT-S-SOD25-0003	0	to	3	110	136	21%	136	MG/KG
D		MWT-S-SOD25-0306	3	to	6	19	52	93%	52	MG/KG
D		MWT-S-SOD25-0612	6	to	12	16	48	100%	48	MG/KG
D		MWT-S-SOD25-1224	12	to	24	14	26	59%	26	MG/KG
D		MWT-S-SOD50-0003	0	to	3	42	82	65%	82	MG/KG
D		MWT-S-SOD75-0003	0	to	3	120	209	54%	209	MG/KG
D	75	WWT-S-SOD75-0003-D	0	to	3	130	230	56%	230	MG/KG
D	75	MWT-S-SOD75-0306	3	to	6	77	282	114%	282	MG/KG
D	75	WWT-S-SOD75-0612	6	to	12	54	142	90%	142	MG/KG

TABLE 1
SUMMARY OF LEAD ANALYTICAL RESULTS
SOIL INVESTIGATION AT THE FORMER MELVILLE WATER TOWER
1331 WEST MAIN ROAD PORTSMOUTH RI

Grid Location		Comple Name B III			Analytical Results					
		Sample Name	Depth in Inches		Laboratory 1	Laboratory 2	RPD	Maximum Concentration	Units	
D		MWT-S-SOD75-1224	12	to	24	8	12	39%	12	MG/KG
D		MWT-S-SOD100-0003	0	to	3	55	671	170%	671	MG/KG
D	125	MWT-S-SOD125-0003	0	lo	3	86	124	36%	124	MG/KC
D	125	MWT-S-SOD125-0306	3	to	6	41	86	71%	86	MG/KG
D		MWT-S-SOD125-0612	6	to	12	20	73	114%	73	MG/KG
_D	125	MWT-S-SOD125-1224	12	to	24	25	44	56%	44	MG/KG
D	150	MWT-S-SOD150-0003	0	to	3	36	60	50%	60	MG/KG
D	178	MWT-S-SOD178-0003	0	to	3	20	56	95%	56	MG/KG
D		MWT-S-SOD178-0306	3	to	6	34	36	6%	36	MG/KG
D		MWT-S-SOD178-0612	6	to	12	18	36	66%	36	MG/KG
E	0	MWT-S-SOE0-0003	0	to	3	32	48	41%	48	
E		MWT-S-SOE25-0003	0	to	3	31	65	71%	65	MG/KG
E		MWT-S-SOE50-0003	0	to	3	240	494	69%	494	MG/KG
E	75	MWT-S-SOE75-0003	0	to	3	94	312	107%	312	
Ē		MWT-S-SOE100-0003	0	to	3	200	321	46%	321	MG/KG MG/KG
E		MWT-S-SOE125-0003	0	to	3	56	101	57%	101	MG/KG
E		MWT-S-SOE150-0003	ō	to	3	27	67	86%	67	
E		MWT-S-SOE175-0003	0	to	3	15	39	89%	39	MG/KG
E		MWT-S-SOE175-0003-D	0	to	3	16	43	91%	43	MG/KG
F		MWT-S-SOF1-0003	0	to	3	2900	6670	79%	6670	MG/KG
F	1	MWT-S-SOF1-0003-D	0	to	3	4200	9120	74%	9120	MG/KG
F		MWT-S-SOF1-0306	3	to	6	1400	2680	63%	2680	MG/KG
F		MWT-S-SOF1-0306-D	3	to	6	1300	2480	62%	2480	MG/KG
F		MWT-S-SOF1-0612	6	to	12	670	2210	107%	2210	MG/KG
F	1	MWT-S-SOF1-1224	12	to	24	370	486	27%	486	MG/KG
F		MWT-S-SOF2-0003	0	to	3	3400	5810	52%	5810	MG/KG
F	2	MWT-S-SOF2-0306	3	to	6	1700	3150	60%	3150	MG/KG MG/KG
F		MWT-S-SOF2-0612	6	to	12	1400	3780	92%	3780	A Company of the Comp
F	3 1	MWT-S-SOF3-0003	0	to	3	2700	3170	16%	3170	MG/KG MG/KG
F	3 1	MWT-S-SOF3-0306	3	to	6	1800	3310	59%	3310	MG/KG
F		MWT-S-SOF3-0306-D	3	to	6	1900	3280	53%	3280	The second second
F		MWT-S-SOF3-0612	6	to	12	460	1430	103%	1430	MG/KG
F		MWT-S-SOF3-1224	12	to	24	28	53	62%	53	MG/KG
F		MWT-S-SOF4-0003	0	to	3	1800	2600	36%	2600	MG/KG
F		MWT-S-SOF4-0306	3	to	6	830	2380	97%	2380	MG/KG
F		MWT-S-SOF4-0612	6	to	12	880	1470	50%	1470	MG/KG
F		MWT-S-SOF4-1224	12	to	24	1300	3450	91%	3450	MG/KG
F		WWT-S-SOF4-1224-D	12	to	24	2800	3830	31%	3830	MG/KG
Z		MWT-S-SOZ163-0003	0	to	3	21	69	106%	69	MG/KG
Z.		MWT-S-SOZ183-0003	0	to	3	180	536	99%	536	MG/KG MG/KG

NOTES:

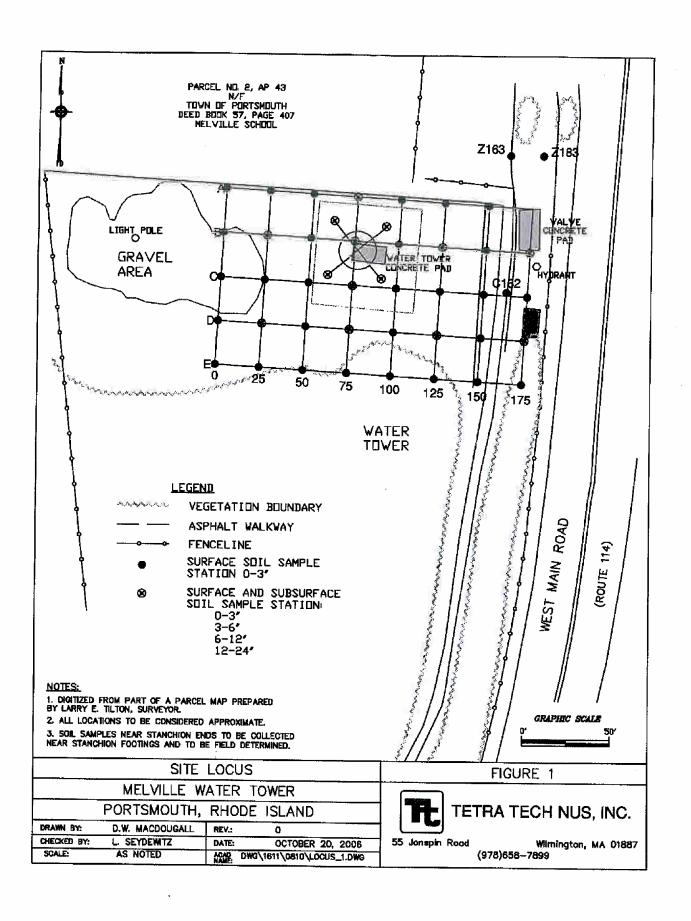
Refer to Figures 2-6 for grid positions

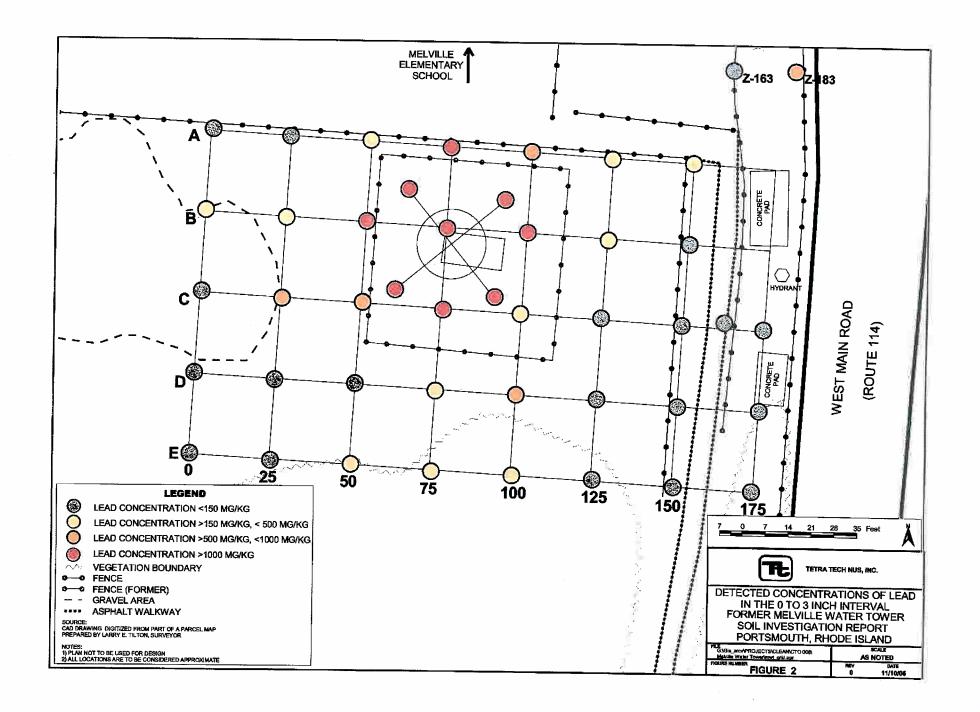
Maximum concentrations are used for mapping on Figures 2-6

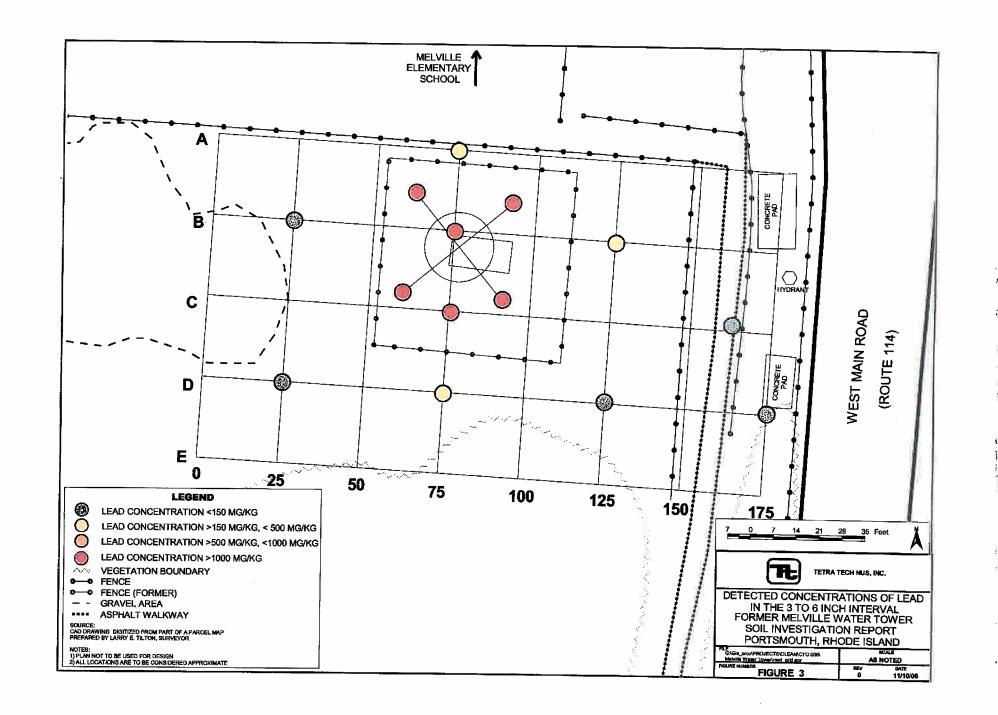
TABLE 2
SUMMARY OF LEAD ANALYTICAL RESULTS
EXCAVATION FOR TEMPORARY CONNECTION FOUNDATION
MELVILLE WATER TOWER, 1331 WEST MAIN ROAD PORTSMOUTH RI

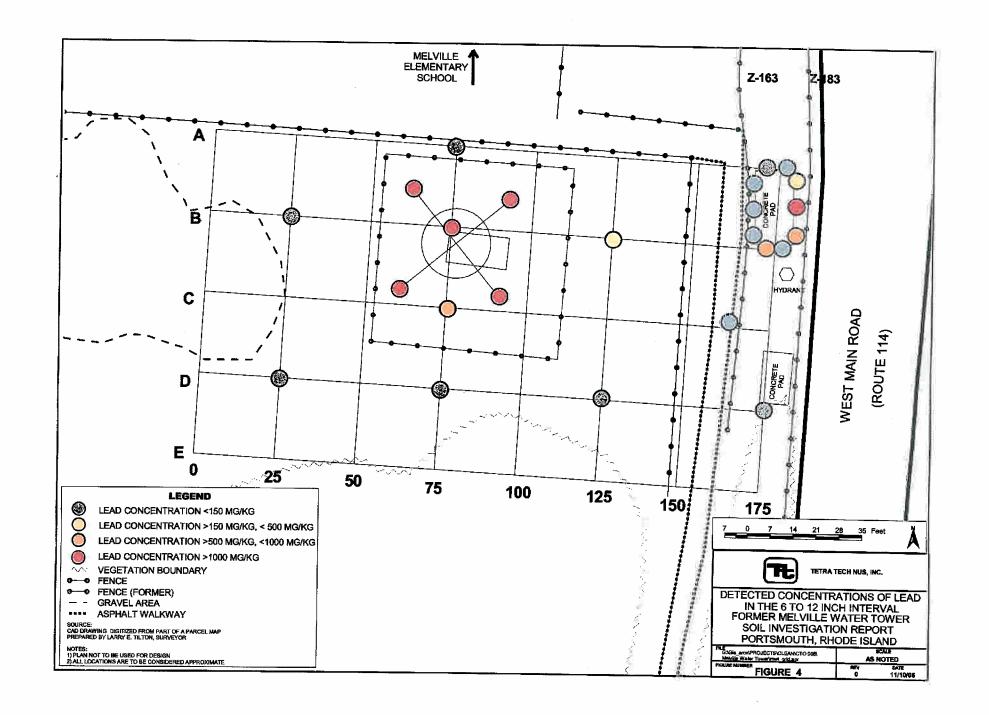
Location		cation Depth in Inches			Results	Units	Comments
Q1	East Wall	6	to	12	624	mg/kg	
Q1	South Wall	6	to	12	95	mg/kg	
Q1	Bottom	12	to	14	114	mg/kg	
Q2	East Wall	6	to	12	1110	mg/kg	
Q2	Bottom	12	to	14	84	mg/kg	
Q3	North Wall	6	to	12	49	mg/kg	
Q3	East Wall	6	to	12	197	mg/kg	
Q3	Bottom	12	to	14	288	mg/kg	Soil Removed
Q4	South Wall	6	to	12	506	mg/kg	
Q4	West Wall	6	to	12	37	mg/kg	
Q4	Bottom	12	to	14	26	mg/kg	
Q5	West Wall	6	to	12	48	mg/kg	
Q5	Bottom	12	to	14	74	mg/kg	
Q6	North Wall	6	to	12	91	mg/kg	
Q6	West Wall	6	to	12	99	mg/kg	
Q6	Bottom	12	to	14	B5	mg/kg	

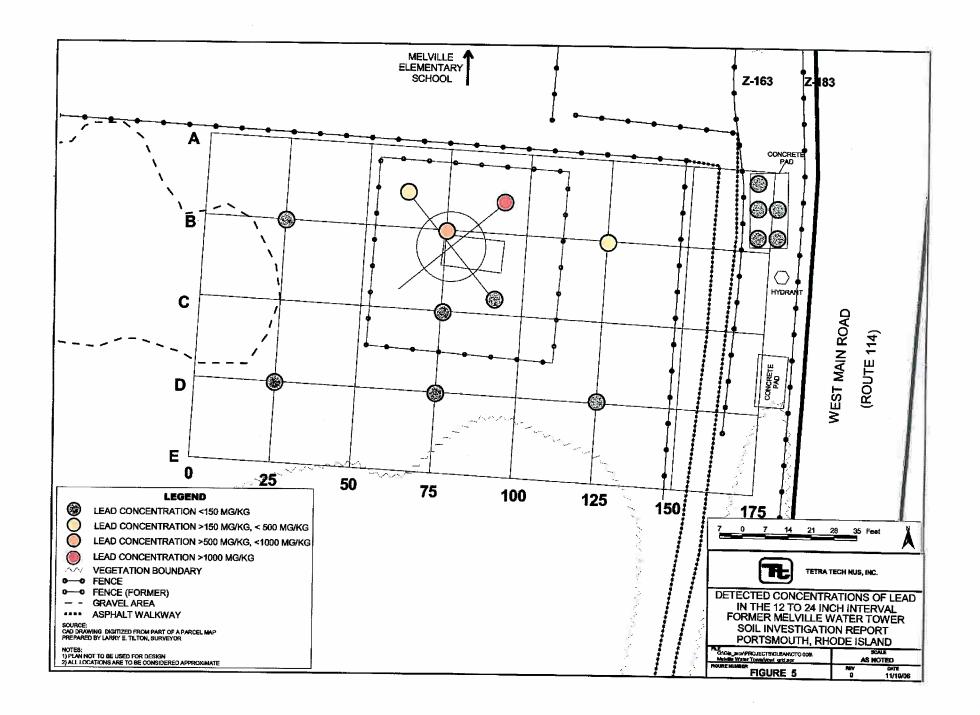
Refer to Figures 4 and 5 for sample stations

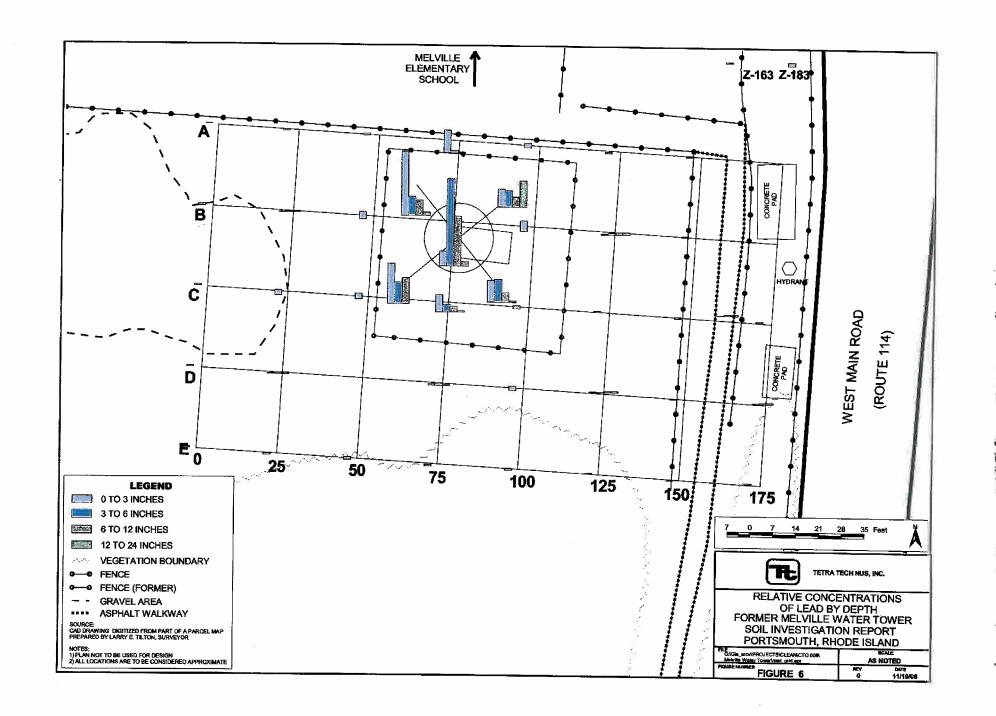












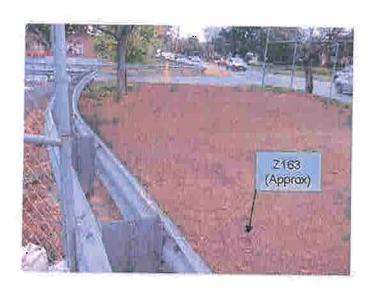


Photo1
General Area of Station Z163
Area has been landscaped after installation of temporary water connection
View is to the north

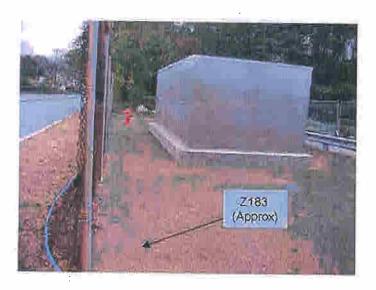


Photo2
General Area of Station Z163
Area has been landscaped after installation of temporary water connection
View is to the south

APPENDIX D ANALYSIS OF SOILS FOR TCLP LEAD

Parker, Stephen

From:

Parker, Stephen

Sent:

Wednesday, May 23, 2007 5:36 PM

To:

Jim Colter, Mid Atlantic; Cornelia Mueller NAVSTA Newport

Cc:

Forrelli, James; Trepanowski, John; Glenn, Garth; Smith, Brandon; Logan, Joe

Subject:

Melville Water Tower: Assessment of TCLP Lead

Attachments:

MWT RCRA C soil.PDF; MWT Total TCLP Pb Rr.xls

All -

Attached is a brief assessment of the TCLP and total lead concentrations that were measured in 8 samples collected at the Melville Water Tower site in Portsmouth RI on May 16, 2007. Each sample was collected as a three - point composite sample from locations formerly sampled. Sample locations were selected to provide a range of total and TCLP lead concentrations to develop a correlation between the two parameters.

A linear regression for comparing total lead to TCLP lead was conducted for all 8 samples collected on that day, which provides an R2 of 0.56. With one data outlier ejected from the data set, the linear regression provides an R2 of 0.989. The R2 indicator illustrates how well the Linear Regression Trendline approximates real data points. An R2 of 1.0 would provide the highest confidence possible for predicting TCLP concentrations using total lead concentrations.

Using this information, it can be predicted that the soil that contains 1,000 mg/kg of total lead or more is likely to exceed the TCLP limit for lead of 5 mg/L. Therefore, soil containing above 1,000 mg/kg total lead will likely be required to be disposed of as RCRA C waste.

Using the data we have collected to date, we estimate that the extent of soil exceeding 1,000 mg/kg total lead conservatively encompasses an area of approximately 75x62.5 feet, to a depth of 2 feet below ground surface. A volume of 9375 cubic feet or 347 cubic yards of soil in place is estimated. Using a conversion factor of 1.5 tons per cubic yard, total weight of this material is estimated at 520 tons. This volume could be reduced but only with increased risk of a some material being rejected at the disposal facility.

Provided attached are two files provided as backup for this assessment. Please do not hestite to contact me if you need further information on this.





MWT RCRA C 4WT Total TCLP Pb soil.PDF (266 KB) Rr.xls (33 ...

Please note that effective April 27 I will have a new direct dial number: 978-474-8434 (other numbers will not change).

Stephen S. Parker, LSP | Sr. Project Manager

Direct: 978-658-8434| Main: 978-658-7899 | Fax:978-658-7870 stephen.parker@ttnus.com

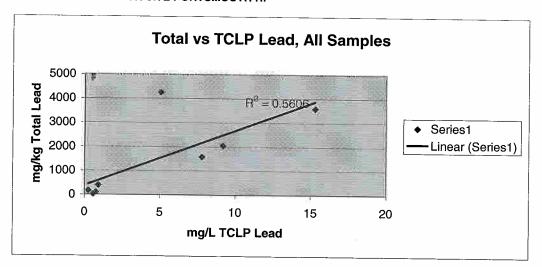
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ASSESSMENT OF TCLP RESULTS FOR LEAD MELVILLE WATER TOWER SITE PORTSMOUTH RI

Total Pb (mg/kg)	TCLP Pb (mg/L)
24.3	0.563
108	0.75
172	0.26
399	0.92
1580	7.78
2050	9.19
3600	15.3
4250	5.05
	108 172 399 1580 2050 3600



Data point	Total Pb (mg/kg)	TCLP Pb (mg/L)
Pole-0006	24.3	
C25-0009	108	0.75
D75-0006	172	0.26
B125-0006	399	0.92
SE-0009	1580	7.78
NE-0012	2050	9.19
NW-0006	3600	15.3

SW-0006 removed as an outlier

	Tota	I vs TCLP Le	ead 7 of 8 S	amples	
4000	- Z I Wat		17 - 17 - 17 - 17 - 17 - 17 - 17 - 17 -		
3500		$R^2 = 0$.9894		
g 3000 					
2500 - 2000 -					
		1			• Series1
1500 - E 1000 -	/	·			—Linear (Series1)
Ĕ 1000 -					
500 -					
0					
0	5	10	15	20	
		ng/L TCLP Lea	, d		